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THE PROBLEM OF MALIGNANCY IN NODULAR GOITER—RECAPITULATION AND A CHALLENGE

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The relation of thyroid cancer to nontoxic nodular goiter and to initially benign thyroid adenomas has been the subject of prolonged and vehement controversy. Some authors have claimed that very many nontoxic nodular goiters are malignant and have recommended immediate thyroidectomy in all cases. It is here pointed out that nontoxic nodular goiter is a fairly common finding (at least 30,000 palpable goiters per million of population) while thyroid cancer is rare (only 25 cases diagnosed per million of population per year). There is evidence that surgical removal of all nodular goiters would result in more loss of life than could be justified by the resultant decrease in mortality from thyroid cancer. Emphasis today should be on the differential diagnosis of the thyroid nodule, with prompt operation in cases where the probability of malignancy is high and conservative treatment otherwise.

THE ASSOCIATION between nodular goiter and thyroid cancer was first commented on many years ago. Thyroid cancer was known to be more common in regions where goiter was prevalent than in "nongoitrous" areas. Leading authorities taught that the majority of thyroid cancers arose in previously benign adenomas. However, there was not much concern over the risk of cancer in the individual patient with nodular goiter. In 1929, for example, Coller [1] wrote:

> The ratio of carcinoma to goiters removed varies with the clinic from 1.2 to 4.6 per cent, but this gives an exaggerated idea of the adenoma as a precancerous lesion. As Balfour pointed out, patients with cancer of the thyroid eventually seek surgical aid, while the majority of persons with adenomatous goiters are not operated on. The true incidence of carcinoma in adenoma cannot be stated, but it would be very much less than any figures we have at present. The adenoma is a precancerous lesion but the true incidence is so small that it should not be a great cause for anxiety to the person with adenomatous goiter.

In 1945, however, this view was strongly challenged by Cole, Slaughter, and Rossiter,[2] who stated that a high percentage of nontoxic nodular goiters are malignant. Since then literally hundreds of papers have been written on this subject, and discussion of the problem has often been marked by violent controversy. Some authors have claimed that very many nontoxic nodular goiters are malignant and have recommended immediate thyroidectomy in all cases. Others feel that the incidence of malignancy in nodular goiter is quite low, that only a few selected cases should be

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operated on, and that even in these cases moderate delay in treatment has relatively little effect on the final outcome. In spite of the extensive literature on this subject, no agreement appears to have been reached regarding the basic statistics or the preferred management of patients with nodular goiter. It is the purpose of this paper to review this problem, summarize the opposing viewpoints, call attention to additional statistical evidence which is now available, and indicate the kinds of information needed to resolve the present controversy.

Arguments for Routine Removal of Nodular Goiters

By far the majority of publications on this subject support the view that the incidence of malignancy among nontoxic nodular goiters is quite high and that most or all such goiters should be removed as soon as they are detected, because of the risk of cancer. It has been claimed that many lives could be saved by systematic search for, and removal of, nodular goiters. This doctrine, which is taught to most medical students and surgical residents today, is based on the following considerations:

Statistics from many surgical centers throughout the United States indicate that from 4 to 17% of all nontoxic nodular goiters removed are malignant.

The reports dealing with this subject are too numerous to discuss individually. Some authors reporting very high percentages of malignancy have included patients known preoperatively to have thyroid cancer under the heading of "nontoxic nodular goiter." This practice is undesirable and tends to confuse the issue. The question under discussion is, "How many nodular goiters are malignant?" not, "How many thyroid cancers are malignant?" When the two groups are combined in varying proportions, statistical evaluation becomes impossible. Fortunately, many authors guilty of this practice provide sufficient information to make it possible to exclude the known cancers and recalculate the necessary percentages. When this is done, the percentage of malignant goiters is reduced somewhat and agreement with other reports is better. One may conclude that approximately 8% of nontoxic nodular goiters removed at representative surgical centers in the United States are malignant.

It is impossible to differentiate preoperatively between benign and malignant goiters.

This statement is made by most authors discussing this problem. In some cases it is supported only by a few case histories of patients thought to have benign goiter who proved to have thyroid cancer. In most reports, however, the preoperative classification of patients is given in evidence. Cases are divided into "cancer suspected" and "cancer unsuspected" groups. As would be expected, malignancy is found more frequently in the former than in the latter. However, even among the nontoxic nodular goiters removed without the preoperative recording of a suspicion of cancer, histological examination demonstrates malignancy in a significant number. There is rather good agreement among most authors that the frequency of malignancy in this "cancer unsuspected" operative group ranges from 3 to 7%. This category includes by far the majority of patients and the majority of thyroid cancers, in most recent series. It is concluded, therefore, that preoperative differentiation between benign and malignant goiters is impossible in most cases. Furthermore, many of the criteria on which the clinical impression of thyroid cancer is based, such as fixation, tracheal compression, and vocal cord paralysis, are associated with poor prognosis. It would be unfortunate if surgery were delayed until such signs develop.

Even though a nodular goiter may be benign at the time it is detected, it is likely to become malignant later and should therefore be removed as cancer prophylaxis.

Many authors have emphasized this point. They cite the fact that in many series of thyroid cancers a history of preexistent goiter, often of long duration, was elicited in a large percentage of patients. Some authors cite individual case histories of patients with quiescent, apparently benign nodular goiters which eventually began to grow rapidly and proved to be thyroid cancer. Lahey and Hare [1] stated, "Prophylactic removal of all discrete adenomas would do much to lower, if not abolish, the occurrence of cancer of the thyroid." However, no author recommending prophylactic thyroidectomy has presented evidence to indicate just how frequently benign goiters become malignant. Some, in fact, have minimized this argument and base their recommendation for routine removal of nodular goiters on the thesis that thyroid nodules are likely to be malignant rather than become malignant.

The operative mortality and morbidity in nontoxic nodular goiter is so small as to be insignificant. Therefore, it is worthwhile to operate on 100 patients even if only 3 or 4 prove to have thyroid cancer.

It has been pointed out that more cancers are found at thyroidectomy for nontoxic nodular goiter than at biopsy of clinically benign breast masses.[4] Since the latter is accepted as a routine procedure, the former should be also. Additional advantages of thyroidectomy which are emphasized include the relief of pressure symptoms, the cosmetic benefits, and the relief of anxiety over possible malignancy on the part of both the patient and the doctor.

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Arguments Against the Routine Removal of Nodular Goiters

Several authors have voiced strong objections to the thesis that all nontoxic nodular goiters should be removed as soon as they are found. They present the following arguments:

The statistics reported from surgical centers are highly selected and are not representative of the population in general.

The great majority of patients with nodular goiter are never seen by surgeons and thus do not appear in surgical statistics. Patients often refuse surgical referral, in the conviction that a goiter which has been static and asymptomatic for years need not be removed. General practitioners and internists refer asymptomatic patients to surgeons chiefly when they are concerned over the possibility of cancer (whether or not they record such suspicion in the clinical record). Many nodular goiters regress with iodine or thyroid medication, or spontaneously, and thus do not appear in surgical statistics. Thus, only a minority of nontoxic nodular goiters are operated on; these have been carefully selected at nonsurgical levels, with elimination of most of the benign cases. The surgeons see, and operate on, a small group which contains most of the thyroid cancers. The percentage of cancer reported by surgeons is simply a reflection of the efficiency of the preoperative selective process. If less preoperative selection took place, the incidence of malignancy among surgical specimens would be lower than the usual 8%. In one series with relatively little selection, cancer was found in 1.7% of nodular goiters.[5]

Nodular goiter is quite common, while thyroid cancer is very rare. Therefore, only a small percentage of nodular goiters could possibly be malignant.

Estimates of the frequency of nontoxic nodular goiter in various regions of the United States have been made. The population samples examined varied considerably. Results range from 3 to 4%, detected during physical examination of healthy adults in a "nongoitrous" community,[6] to 57%, found on sectioning of thyroid glands at autopsy, in an area having a high incidence of endemic goiter.[7] Even the lowest of these estimates indicates that several million people in this country have nodular goiter. On the other hand, the frequency of thyroid cancer is very low. The annual incidence of thyroid cancer in the United States is about 25 per million population.[8] Recorded deaths from thyroid cancer number about 1,000 per year in the entire United States, according to the National Office of Vital Statistics. It is obvious, therefore, that only a very small percentage of nodular goiters could be malignant.

Benign goiters can be distinguished clinically from possibly malignant ones with considerable accuracy.

This statement is supported by several lines of argument. The fact that malignancy is found in about 8% of surgical specimens, while statistical calculations indicate that considerably fewer than 1% of all nontoxic nodular goiters could possibly be malignant (see above), is prima facie evidence of rather efficient selection for surgery. There are objections to this simple "proof" of selection, however, which will be discussed below. More acceptable is the evidence presented by authors such as Crile and Dempsey [9] and myself [10] that a relatively large number of cancers were found among nontoxic nodular goiters initially selected for surgical treatment, while few or no cancers were found on follow-up of cases where surgery was not initially recommended. Finally, it has been pointed out by several authors that the thyroid gland is very favorably situated for clinical examination and that a skilled examiner can readily decide whether nodules are likely to be malignant or benign, without waiting for such frank signs of advanced cancer as vocal cord paralysis. Hard, irregular masses with indistinct margins, which grow progressively, are certainly suspect. On the other hand, round, smooth, soft or cystic, sharply defined nodules, which do not grow, may be left alone. Important factors in reaching a clinical decision are reexamination of the thyroid on several occasions over a few months and observation of the effect of thyroid medication on the size of the goiter. Most benign nodules become smaller or disappear with such medication.[11] Radioactive iodine-uptake studies may also be of assistance in differentiating between benign and malignant nodules.[12]

Benign goiters very rarely undergo malignant transformation; hence prophylactic thyroidectomy is not indicated. Furthermore, there is no assurance that prophylactic partial thyroidectomy will prevent the development of thyroid cancer.

Some statistics are now available on the follow-up of groups of patients with apparently benign nontoxic nodular goiter.[13] The development of thyroid cancer among such patients is a very rare event. The principal criticism of some reports of this sort is that the follow-up period may be too short.

The efficacy of prophylactic thyroidectomy is challenged by the presentation of case histories in which thyroid cancer was found some years after the removal of benign nodular goiters. Such cases are not particularly unusual; in one series of thyroid cancer, 17% of patients had had previous thyroidectomy for benign goiter.[14]

Moderate delay in surgical treatment does not appreciably change the outcome of thyroid cancer.

Most authorities agree that thyroid cancers may be classified into two broad groups, according to biological behavior. One, accounting for perhaps one-third of the cases and including several histological types, grows rapidly and invades early and

is usually not cured even when immediate surgery is performed. The other, accounting for the majority of cases (principally, papillary adenocarcinoma), grows slowly, is relatively noninvasive, metastasizes late, and has a high "cure rate" even when surgery has been long delayed. Hence, a period of three to four months of observation, prior to reaching a final decision regarding surgery, is justifiable. During this period, the criteria for malignancy or nonmalignancy can be reevaluated and the effect of thyroid or iodine medication can be studied.

Some Statistical Considerations

Frequency of Nodular Goiter and Thyroid Cancer.—An upper limit for the frequency of malignancy among nontoxic nodular goiters can be calculated by comparing the number of such goiters to the number of thyroid cancers in the population. Obviously, if in a particular community there are 1,000 people with nodular goiter and 20 with thyroid cancer, the incidence of malignancy among the nodular goiters cannot be greater than 2%. It may be less than this, however. If five of the thyroid cancers did not present as nodular goiters, for example, the incidence of malignancy among nodular goiters would be only 1.5%. Thus, if we can estimate the frequency of nodular goiter and of thyroid cancer in the United States, we can calculate the maximum possible incidence of malignancy in nodular goiter. The actual figure will be lower than this, since it is known that some thyroid cancers do not arise in nodular goiter and do not present as palpable thyroid nodules. Others are obviously cancer when first seen and would not be counted among nodular goiters.

Several years ago, I made some estimates of the prevalence of nodular goiter and of thyroid cancer in the United States and attempted such calculations of the frequency of malignancy among nontoxic nodular goiters. The basic data I used were not as complete and as accurate as the statistics now available, and my results were, in part, based on indirect calculations. In the light of the better information now available, it is possible to calculate the desired figures more accurately.

The prevalence of nodular goiter differs in different parts of the country and varies with sex and age. It is higher among women than men, in the older age groups than in young adulthood, and in the Great Lakes and Pacific Coast regions than in the East or South. Not all thyroid nodules are clinically detectable; autopsy studies regularly show a higher incidence of nodular goiter than do clinical surveys. Since the problem under discussion is a clinical one, the desired figure is that giving the percentage of clinically palpable nodular goiters in our population. In order for this figure to be representative of the entire population, it should be based on surveys of apparently well individuals, rather than on hospitalized groups, where the incidence of all types of abnormalities might be higher.

The best study of the prevalence of nodular goiter in a representative population sample is that reported by Vander, Gaston, and Dawber.* These authors examined over 5,000 individuals between the ages of 30 and 60 in a Massachusetts community. This sample constituted over half of the total population of the community in this age group. Thyroid nodules were felt by one or more examiners in 4% of this group. Individuals under 30 years of age were excluded from Vander's study. This age group, with a low incidence of nodular goiter, outweighs the smaller group over 60 years of age, also excluded, where thyroid nodules are more common. Thus the prevalence of palpable nodular goiter in the entire population of the community sampled by Vander is probably about 3%, rather than 4%. Statistics of comparable quality are not available for other regions of the country. However, such data as are available would suggest that the average for the United States as a whole is higher than that for the eastern seaboard. A very conservative estimate of the prevalence of clinically detectable nodular goiter in the United States as a whole would thus be 3 to 4%, or 30,000 to 40,000 per million population.

A highly accurate figure for the incidence of thyroid cancer in the United States has recently been presented by Mustacchi and Cutler.* It is based on a careful survey of 10 metropolitan areas in different regions of the country, with a combined population of 14,600,000. On the average, 25 thyroid cancers are diagnosed annually per million population. This is less than 1 case per 1,000 individuals with nodular goiter.

Comparison of the number of thyroid cancers diagnosed per year with the total number of nodular goiters in the community is a somewhat improper, though striking, way to present these statistics. It does, however, indicate the maximal annual risk for the individual with nodular goiter. This is small indeed. A better way of expressing this hazard is in terms of cumulative risk over a period of years, or over a lifetime. The cumulative incidence of thyroid cancer over an average lifetime of 65 years, calculated from Mustacchi's data, is 1,500 per million population. No good data are available for calculating the cumulative lifetime incidence of nodular goiter. This, of course, would be considerably higher than the prevalence in an average population at one time, given above. It cannot be much less than the 10% estimate I have made in the past, or about 100,000 per million population. Thus, among a million representative inhabitants of the United States, 100,000 would have nodular goiter at some time during their lives and 1,500 would develop thyroid cancer. Since not all thyroid cancers develop in preexistent goiter,

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the total lifetime risk for an individual with nontoxic nodular goiter cannot be much more than 1%.

Accuracy of Preoperative Evaluation of Nodular Goiters.—Whether it is possible to differentiate preoperatively between benign and possibly malignant goiters has been heatedly debated. The statistical proof of preoperative selection of thyroid cancers, referred to above, does not constitute a satisfactory answer to this question. Even if preoperative diagnosis were impossible, such statistical selection would still be observed, since thyroid cancers eventually come to surgery while most benign goiters do not. On the other hand, reports that "unsuspected" cancers were found in 3 to 7% of thyroidectomies do not constitute satisfactory evidence either. After all, there must have been some reason for referring these patients to surgery. On reviewing clinical charts in a leading university hospital, I encountered many cases in which small asymptomatic nodular goiters were removed without any indication that malignancy was suspected.[10] However, no other indication for surgery could be found on careful review of these charts. Other, apparently similar, cases were not referred for surgery. I was forced to the conclusion that physicians are often reluctant to record their suspicions of cancer in hospital charts.

Surgical statistics from representative university hospitals indicate that about 200 to 500 thyroidectomies for nontoxic nodular goiter are performed annually per million population. This represents only a fraction of the new nodular goiters arising in the community. If preoperative selection of possibly malignant goiters is impossible, then the great majority of thyroid cancers should not reach surgery until they are in an advanced stage, with malignancy clinically obvious. Survival rates should be poor. However, the opposite is the case. The majority of thyroid cancers are resectable, and current survival rates for thyroid cancer are better than for most other neoplasms. The majority of surgical failures are accounted for by the more rapidly invasive lesions, which usually come to operation promptly. Thus, preoperative selection of nodular goiter cannot be random from the standpoint of malignancy, whether or not suspicion of cancer is recorded.

Some degree of preoperative differentiation between benign and malignant goiters is therefore not only possible but actually occurring. In order to evaluate how accurately this can be done, individual series must be analyzed and the initial decision regarding surgery evaluated. Patients not operated on must be followed over a sufficiently long period of time to permit a decision as to whether cancer was originally present. In view of the slow progression of some thyroid cancers, a 10-year follow-up would be preferable to a 5-year one. Although follow-up reports on patients with nodular goiter not operated on have been given by several authors, the period of observation in most cases was not long enough to permit definitive conclusions to be drawn. In the small series I reported,[10] where follow-up was more adequate, highly accurate preoperative selection was demonstrated. Until additional studies are reported, however, an unqualified statement about the accuracy of preoperative selection cannot be made.

Uninodular Versus Multinodular Goiters.—Many authorities believe that malignancy is significantly more common among solitary thyroid nodules than in multinodular goiter. Lahey and Hare,[3] the principal proponents of this view, found thyroid cancer in 10% of uninodular but only 0.6% of multinodular goiters. No other author has reported such a striking difference, and some report no difference. On the average, cancer is found perhaps twice as often among uninodular glands as among those with multiple nodules. In some cases, this may be due to destruction of other preexistent benign nodules by a cancer infiltrating the thyroid gland. In any case, the clinical value of this distinction is dubious. Most nodular goiters are thought to be uninodular clinically.[13] However, at surgery or autopsy most prove to be multinodular. The number of thyroidectomies required to remove all apparently uninodular goiters would not be very much less than the number required to remove all nodular goiters, both uninodular and multinodular. Many authorities have therefore abandoned the attempt to differentiate between patients with uninodular and those with multinodular glands.[16]

Follow-up of Patients with Nodular Goiter.—The present controversy over nodular goiter could be conclusively resolved if statistics were available on the fate of a satisfactory unbiased sample of individuals with nodular goiter. Almost all of the statistics so far presented on this subject are based on selected groups of patients who are not representative of the populations of their respective communities. Patients referred for thyroidectomy constitute a biased sample which contains an excess number of malignant goiters. Patients examined and not referred for thyroidectomy also constitute a biased sample, containing an excess of benign goiters. Only by choosing a representative population sample through criteria not involving the thyroid, and then identifying all the individuals in that sample with nontoxic nodular goiter, can a valid study group be obtained. Follow-up of such a group for a sufficiently long period of time would provide direct answers to the questions presently in dispute: the true incidence of malignancy among nontoxic nodular goiters, the frequency with which benign goiters become malignant, and the accuracy of preoperative evaluation of nodular goiters.

The study of Vander, Gaston, and Dawber [9] is the only one so far reported which meets the above criteria. The preliminary report of these authors,

presenting a five-year follow-up of 218 apparently healthy individuals with nontoxic nodular goiter, was published in 1954. Dr. John B. Vander [17] of the U. S. Public Health Service has very kindly furnished the following additional information on this group, now followed for 10 years: Twelve members of the group are now dead (coronary occlusion, seven, and cerebral vascular accident, carcinoma of kidney, carcinoma of cecum, carcinoma of liver, and carcinoma of lung, one each). No member of the group has as yet developed evidence of thyroid cancer.

Although 218 individuals do not constitute a very large sample, and 10 years is not a definitive follow-up period, these findings are highly significant. It is very unlikely that any thyroid cancers originally present in this group would not by now have become evident. If 8% of nontoxic nodular goiters are malignant, 17 thyroid cancers should have appeared in this group. The probability that no thyroid cancer would occur in a sample of this size, drawn from a very large hypothetical population with an 8% frequency of thyroid cancer, is 0.0000001. The probability that such a sample would be drawn from a population with a 4% frequency of thyroid cancer is 0.00013. This constitutes very strong evidence that the true frequency of malignancy among nodular goiters is much less than 8%, or than 4%. On the other hand, statistical evaluation supports the hypothesis that the correct figure is less than 1% (89% probability). Thus, the direct evidence on this point confirms the indirect calculations presented above.

Similarly, adequate follow-up information on patients with nodular goiters not operated on can provide direct evidence regarding the frequency with which benign nodular goiters become malignant. Here, selection of a study group is simpler. All that is necessary is to identify a group of individuals with benign goiters at some arbitrary point in time and follow their fate. Cases in which thyroid cancer becomes evident within a relatively short period (e. g., six months for anaplastic carcinoma, two years for papillary adenocarcinoma) should be excluded, since such would probably have been malignant at the start of the study. A 10-to-20-year follow-up of all other cases would provide the desired information with satisfactory accuracy; even a 5-to-10-year follow-up would provide useful data. Such a study could be performed retrospectively, if an unbiased method is available for identifying patients known to have had nontoxic nodular goiter at an appropriate time in the past. The limited direct evidence of this type so far available, as well as my indirect calculations,[10] indicate that malignant transformation of benign nodular goiters is very rare.

Again, the prospective or retrospective follow-up of a suitable group of patients with nontoxic nodular goiter would provide information on the efficiency of preoperative identification of malignant goiters. Some members of such a group of patients will undergo thyroidectomy promptly after their goiters are discovered. Others will be operated on at some later time. A few might die of inoperable thyroid cancer. By comparing the frequency of curable and incurable thyroid cancers among the patients promptly referred to surgery with the frequency of such cancers in the group where surgery was delayed, an evaluation of preoperative selection can be made.

Comment

Incidence of Thyroid Cancer.—The opposing camps are in agreement on only one point, that nontoxic nodular goiter is a fairly common finding. I know of no one who has criticized my estimate of the frequency of nodular goiter as too high; many would say it is too low.[18] There was some disagreement in the past over the incidence of thyroid cancer. More recently, however, review of all types of statistics on thyroid cancer showed them to be in satisfactory agreement. The figures presented by Mustacchi and Cutler [9] are based on an extremely thorough survey of a large sample of the entire population of the United States. An incidence of thyroid cancer of 25 cases per million population per year is as close to the final verdict as epidemiologic techniques can give.

We are all agreed that there are at least 30,000 to 40,000 individuals with nodular goiter per million of population. If 8% of all nodular goiters are malignant, then there must be 3,000 cases of thyroid cancer per million population. However, only 25 are diagnosed per year. Where are the others? They are not being cured, for they do not appear in surgical statistics.[19] Nor are the patients dying, for the cases do not appear among death certificates or on the autopsy table. Clearly, the burden of proof must now rest on those who claim that such large numbers exist at all.

The evidence for a highly efficient preoperative selective process appears unassailable. Where careful preoperative selection is practiced, the incidence of cancer among nodular goiters removed may be as high as 17%.[12] Where less selection occurs, it may be one-tenth of this figure.[3] Surgeons are usually not aware of the extent of preoperative selection, since it is accomplished principally by patients, general practitioners, and internists. In discussions of this problem with general practitioners, I have frequently been told, "I have followed quite a few patients with nodular goiter for years. I have never seen a thyroid cancer in my practice." It is unfortunate that the combined experience of a group of general practitioners has never appeared in the literature of this subject.

A Challenge:—There are, at the very least, 5 million people in the United States with palpable nontoxic nodular goiter. If as many as 8% of these

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goiters are malignant, there must be over 400,000 thyroid cancers in the United States. Nodular goiter is not a new disease, so it cannot be claimed that these hypothetical cancers have not yet become evident. If so many cases of thyroid cancer exist, it should be possible to find them. Let those who claim that they exist survey a suitable population sample and show us the necessary number of people either dying or being cured of thyroid cancer.

Differentiation of Benign from Malignant Goiters.—The evidence so far available indicates that very few benign nodular goiters become malignant. In several series, totaling about 6,000 patient-years of observation, no thyroid cancers were observed to develop among presumably benign nodular goiters. The study of Vander, Gaston, and Dawber [4] is a particularly important one in this regard, since it represents a carefully organized prospective study of a relatively large and representative sample of a healthy population. Future reports from these workers should provide a definitive answer on this point.

Probably the most important, and certainly one of the most hotly debated, points in the controversy over nodular goiters is the question, "Can benign goiters be differentiated preoperatively from possibly malignant ones?" Plausible arguments have been presented by both sides. Here, the proof of the pudding must be in the eating. If a relatively large number of nodular goiters referred for surgical extirpation contain cancer (as they do), and very few goiters not so referred prove to be malignant (as appears to be the case), then preoperative differentiation is being successfully practiced, whether or not cancer suspicion is recorded in patients' charts.

A Challenge:—A prospective study of the efficiency of preoperative selection in nontoxic nodular goiter would take years to complete. Furthermore, a physician who sincerely believes that it is impossible to differentiate between benign and malignant goiters cannot be expected to violate his conscience by deferring surgery on one group of patients with nodular goiter. However, there is another way to answer this question. Every community has large numbers of people who have had nodular goiter for years. By careful searching of physicians' records and hospital files, it should be possible to identify patients who have had nodular goiter described as an incidental finding many years ago and who were not referred for surgery. (In most institutions it will be necessary to review individual charts, since such "incidental" goiters usually will not appear in a record room diagnostic index.) Let those who believe preoperative selection impossible search for patients recorded as having nodular goiter 10 to 20 years ago, trace these patients, and determine the incidence of thyroid cancer (which should now be obvious) among those not subjected to thyroidectomy. Let them compare this with the corresponding figure for the patients treated surgically. There is no need for concern about whether cancer was suspected or not; in the great majority of cases where cancer was seriously suspected, one may assume that operation followed. Let them simply compare, as I did, the frequency of thyroid cancer among cases where operation was not performed with its frequency among the cases referred for surgery. If preoperative selection is truly impossible, the figures will be identical. They should exclude all patients in the operative group who had palliative resections and, if they wish, all patients who died of thyroid cancer within five years of surgery. Then their figures will certainly measure preoperative selection of "early" cancers.

Conclusions

A generation ago, a large percentage of thyroid cancers were being diagnosed at an advanced and incurable stage. Today, the majority are being diagnosed early and patients are being cured. A major share of the credit for this improvement belongs to the physicians who have called our attention to the potential hazards of the thyroid nodule. As a result of their publications, we are all more aware of the fact that apparently innocent nodular goiter may in fact be thyroid cancer. Patients with suspicious goiters are now being operated on early enough to cure most of the patients with malignant ones. Without question, this is a major advance in cancer therapy. However, as with many reforms, the pendulum has swung too far. The doctrine that all nodular goiters must be extirpated as soon as they are detected is just as fallacious as the attitude that thyroid cancer is an unimportant cause of death and that masses in the thyroid may be ignored.

The mortality and morbidity of thyroidectomy are low. However, they are not zero. As several authors have pointed out, the removal of all nodular goiters would certainly result in more loss of life than could be justified by the resultant decrease in mortality from thyroid cancer. It is clear that our efforts should be directed toward improvement of the criteria for selection of patients for surgery, rather than toward detection and extirpation of all thyroid nodules.

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PULMONARY INFARCTION AFTER DENTAL EXTRACTION

REPORT OF TWO CASES WITH RECOVERY

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Two case-histories involving men aged 40 and 38 years illustrate the occurrence of pulmonary disease after extraction of teeth. In the first case the pulmonary symptoms commenced seven days after the extraction, with a sudden rise of temperature to 40 C on the 10th day marking the development of a pulmonary infarct. In the second case the pulmonary symptoms commenced five days after the extraction, and the subsequent course was marked by two episodes of severe chest pain indicating the development of pulmonary infarcts. Although the connection of the pulmonary symptoms with the dental procedures was not obvious at first, it became clear later that both patients had cervical phlebothrombosis which led to the pulmonary complications. It is concluded that in all cases of unexplained pulmonary infarction the patient's dental history should be considered.

Although dental extractions are probably the commonest cause of cervical trauma, they are rarely associated with cervical phlebothrombosis or pulmonary infarction. The neck veins usually involved with infection or trauma to the jaws are the ranine, facial, and internal jugular veins. Two patients with cervical phlebothrombosis and associated pulmonary infarction after dental extraction were observed, however, and their cases are reported.

Report of Cases

CASE 1.—A 40-year-old man was admitted to the Mid-State Baptist Hospital on Oct. 3, 1956, with the complaint of chest pain associated with chills and fever of two weeks' duration. Three weeks prior to admission, because of abscess formation and advanced periodontoclasia, his two right upper molar teeth had been extracted after a local infiltration of lidocaine hydrochloride. Two days after the extractions the patient developed unusual pain in the right side of the neck, associated with slight swelling. Five days later the patient had pain in the right lower part of the chest, associated with an elevation of temperature. He was seen by his family physician and was told he had "pneumonia," which was treated with "antibiotics" for two weeks. The pain in the right side of the chest increased and then occurred in the

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left side. He had several "shaking" chills associated with a cough productive of clear sputum. On one occasion the sputum was "streaked with blood." The day before admission to the hospital a roentgenogram demonstrated an elevation of the left dome of the diaphragm, thickening of the pleura, and a wedge of increased density in the left lower lung field. In the right lower lung field were two linear areas of atelectasis above the diaphragm (fig. 1*B*). A roentgenogram made three years previously had revealed a normal cardiac silhouette and clear lung fields (fig. 1*A*).

The patient was an obese apprehensive male, lying comfortably in bed without dyspnea or orthopnea. His blood pressure was 130/90 mm. Hg, pulse 80 per minute, respirations 20 per minute, and temperature 100.4 F (38 C). There was extensive periodontal disease, with ulceration of the anterior gum margins and advanced caries of the right lateral incisor and the second right lower molar tooth. There was slight swelling and tenderness to deep palpation along the right lateral aspect of the neck. The chest was symmetrical and obese. Auscultation disclosed numerous moist inspiratory rales over both lower lung fields posteriorly. The

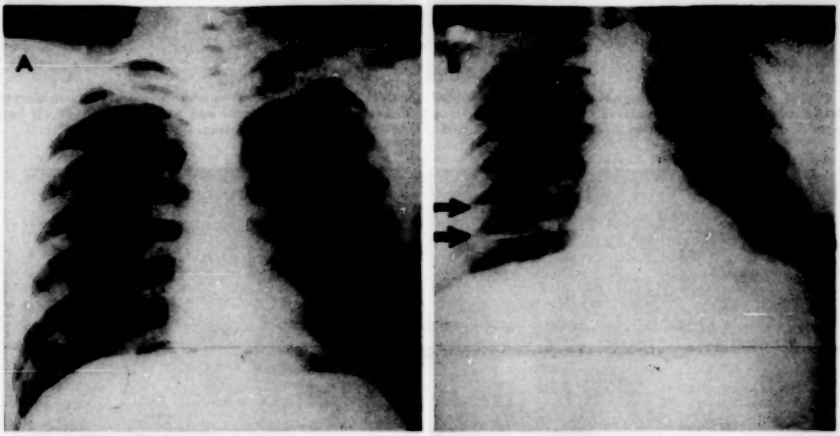

Fig. 1 (case 1).—*A*, normal roentgenograms of heart and lung fields made Sept. 21, 1953. *B*, roentgenogram made Oct. 3, 1956. *Arrows*, pleural thickening and wedge of increased density in left lower lung field and two linear areas of atelectasis above right side of diaphragm.

heart size was normal to percussion and the sounds were of good quality. The peripheral arterial pulsations were equal, and there was no evidence of tenderness, heat, or swelling by direct measurement of the lower extremities.

Pertinent laboratory data were as follows: white blood cell count, 9,300 per cubic millimeter with 68% polymorphonuclear leukocytes. The Veneral Disease Research Laboratory test for syphilis gave negative results. The corrected erythrocyte sedimentation rate (Wintrobe method) was 34 mm. in one hour. Sputum was negative for pathogens. A diagnostic thoracentesis of the left side of the chest was performed and no acid-fast bacilli or malignant cells were found. Result of tuberculin skin test was negative. The electrocardiogram was within the limits of normal.

The provisional diagnosis was "virus pneumonia." The patient was treated with aqueous penicillin, 600,000 units every 6 hours, and dihydrostreptomycin sulfate, 0.5 Gm. every 12 hours. A left anterior oblique roentgenogram eight days after admission to the hospital showed linear atelectasis in the right lower lung field and atelectasis associated with pneumonitis and pleural effusion at the left lung base (fig. 2*A*). Four days later a roentgenogram of the lower anterior teeth demonstrated generalized alveolar absorption and periapical and periodontal abscesses involving the mandibular central incisor and the left cuspid (fig. 3). Ten days after admission to the hospital the patient's temperature rose suddenly to 104 F (40 C) and a roentgenogram demonstrated another area of infiltration, typical of pulmonary infarction, at the left lung base.

After consultation the diagnosis of pulmonary emboli originating from a deep cervical vein phlebothrombosis was made. The patient was given bishydroxycoumarin, and the prothrombin time was maintained at a therapeutic level between 15 and 30% of normal. His daily temperature remained elevated, between 100 F (37.7 C) and 104 F, for 5 days and returned to normal on the 20th hospital day. Anticoagulant therapy was continued until the 28th hospital day. A roentgenogram of the chest on the 30th hospital day demonstrated essentially clear lung fields (fig. 2*B*). Surgical removal of the infected teeth was uncomplicated. The antibiotic therapy was maintained until the 32nd hospital day, at which time the patient was discharged. For the past two years there has been no further difficulty.

This case is of unusual interest because of the development of phlebothrombosis of the neck veins and subsequent pulmonary infarction two weeks after the extraction of infected teeth. Because oral infections may be a source of pulmonary embolization, careful examination of the teeth including roentgenograms should be made in all cases of unexplained pulmonary infarction. The development of a sudden pulmonary or pleural "infection" after dental extraction should alert the physician to the possibility of underlying phlebothrombosis of the cervical veins and pulmonary infarction.

Case 2.—A 38-year-old man was first seen by his family physician on June 5, 1958, complaining of "severe left chest pain" intensified by deep inspiration and associated with a nonproductive cough. Five days previously, after a local infiltration of lidocaine hydrochloride, two infected teeth had been extracted.

His temperature was 99 F (37.2 C). There were marked periodontal disease, swelling and tenderness along the anterior lateral aspect of the right side of the neck, and dulness to percussion and moist rales audible over the lower left lung field laterally and posteriorly. The extremities were without tenderness, heat, or swelling by direct measurement.

On the following day the pain in the left side of the chest became more severe, and a roentgenogram revealed small areas of infiltration suggestive of atelectasis in both lower lung fields. The patient was treated with tetracycline phosphate, 250 mg. every six hours, and there was slight improvement. One week later he had another episode of sudden sharp pain in the lower left chest region and again an area of linear atelectasis at the left lung base was demonstrated (fig. 4A). The white blood cell count was 14,800 per cubic millimeter, and the differential blood count unremarkable.

The patient was admitted to Mid-State Baptist Hospital on June 17, 1958, 12 days after the original onset of chest pain. He was given novobiocin sodium, 250 mg. every six hours, and bishydroxycoumarin. Roentgenograms of the teeth

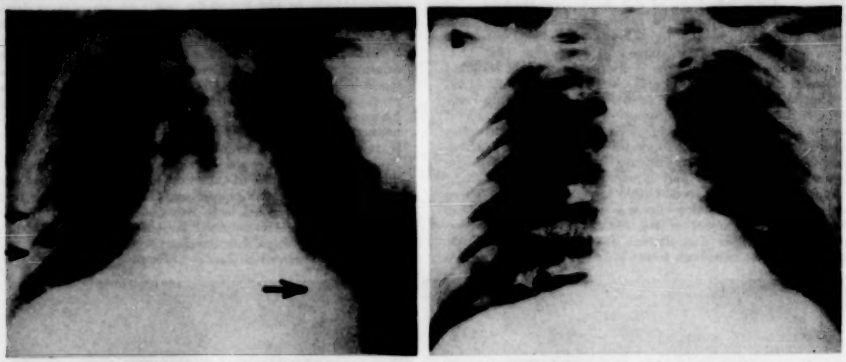

Fig. 2 (case 1).—*A*, eight days after admission to hospital, on Oct. 11, 1956, left anterior oblique roentgenogram demonstrated (*arrows*) linear atelectasis in right lower lung field and atelectasis with pneumonitis and pleural effusion at left lung base. *B*, 30 days after admission to hospital, on Nov. 2, 1956, lung fields were essentially clear.

Fig. 3 (case 1).—*Left*, left cuspid. *Right*, central incisor. *1*, periodontal abscesses; *2*, periapical abscesses.

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revealed far-advanced periodontal absorption. Bishydroxycoumarin therapy was continued for 6 days, and on the 10th hospital day the patient had an uncomplicated full-mouth extraction of the infected teeth. Novobiocin therapy was discontinued three days after surgery. A roentgenogram 30 days after the onset of the illness showed no evidence of infiltration or atelectasis (fig. 4*B*). The patient was discharged after 13 hospital days and for six months has been without symptoms.

Review of Literature

Swift,[1] who in 1940 reviewed 49 cases of neck infections collected between 1930 and 1940, was impressed by the unusual array of causal factors; however, neck infection after extraction of infected teeth was common. All but one of the patients with fatal cases of neck infection had teeth extracted before the onset of the neck infection, and local or block anesthesia was used in all of these cases. In Swift's review there were no cases of thrombophlebitis of the internal jugular veins.

In 1942 Iglauer [2] reported the case of a young woman with occurrence of thrombophlebitis of the left internal jugular vein after a sore throat of two weeks' duration who developed bacteremia with metastatic septic emboli to the shoulder, liver, and right lung with abscess formation. The patient recovered after nine surgical procedures and 133 days of hospitalization.

In 1947 Decker [3] pointed out that septic thrombophlebitis of the neck may result from an original focus of infection in the tonsils, ulcerated lesions of the oral cavity, dental abscesses, pharyngomaxillary abscesses, salivary gland abscesses, cellulitis of floor of mouth (Ludwig's angina), retropharyngeal abscesses, abscesses of the neck, or osteomyelitis of the mandible or maxilla.

Nathanson [4] in 1953 reported the case of a 62-year-old man who had an infected tooth removed from the right maxilla three days before the development of pain and swelling on the left side of the face. This left facial phlebitis and cellulitis developed as a result of a retrograde phlebitis of the right facial veins, caused by the septic tooth extraction. It can be seen that retrograde facial vein thrombophlebitis extending into the ophthalmic vein or the cavernous sinus after tooth extraction is not uncommon.[5]

Comment

The superior venous circulation is rarely considered a source of pulmonary infarction. Since there is often a delay of one or two weeks before the symptoms of embolization appear, it is not surprising that this disease of the lung is not associated with the earlier oral trauma. This suggests an important unrecognized cause of pulmonary disease.

The tendency of physicians to dismiss episodes of chest pain, fever, and cough as a "virus pneumonia" may allow this disease to go unrecognized. The ineffectiveness of antibiotics will only serve to confirm the erroneous diagnosis. An accurate diagnosis, based on recognition of the antecedent oral trauma, or a careful search for signs of cervical venous disease may be expected to reveal the correct etiology. This is more than an academic exercise, because proper treatment should include the early use of the anticoagulants.

Careful inspection of the neck region for swelling, tenderness, or other evidence of venous infection or obstruction should be undertaken, in

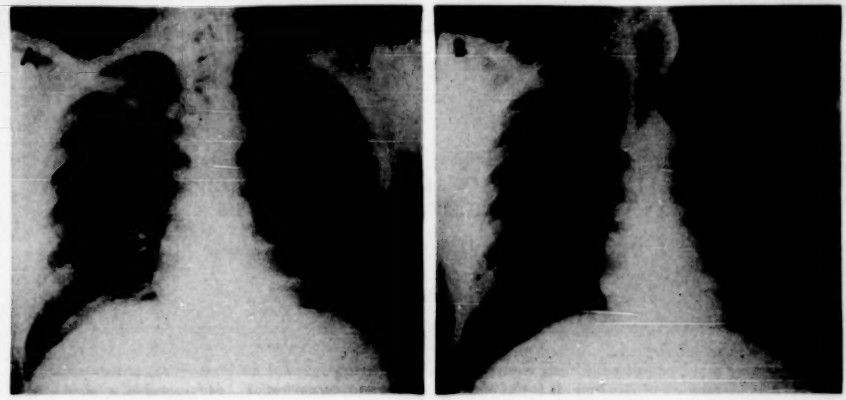

Fig. 4 (case 2).—*A*, chest roentgenogram made on June 19, 1958, demonstrated (*arrows*) linear atelectasis at both lung bases. *B*, on July 5, 1958, 30 days after onset of illness, roentgenogram demonstrated clear lung fields.

addition to routine examination of the lower extremities, with all episodes of unexplained pulmonary infarction.

Summary

Two instances of pulmonary infarction occurred after dental extraction and phlebothrombosis of the cervical veins. Both patients recovered. The superior as well as the inferior venous circulation should be carefully evaluated as a source of unexplained pulmonary infarction, and the distinction between pulmonary embolism arising from phlebothrombosis and "virus pneumonia" after dental extraction should be emphasized because of the importance of early recognition and treatment.

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FILTRATION VERSUS LOCAL FORMATION OF LIPIDS IN PATHOGENESIS OF ATHEROSCLEROSIS

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The method whereby lipids accumulate in the inner layers of the arterial wall to constitute the first recognizable stage of atherosclerosis is one of the most cogent problems of our time. It is the purpose of this presentation to review the evidence for and against the two current hypotheses, filtration and local formation, and to discuss briefly the possible application of the findings to the pathogenesis of atherosclerosis.

Filtration

The data for filtration are based on logic and have no direct support. The argument can be stated simply. Too much of something in the diet leads to too much of something in the blood, and this in turn leads to too much of something in the arterial wall. This philosophy pervades much of the current literature about the relationship of dietary fats to atherosclerosis and implies that filtration is the mechanism whereby visible lipids make their appearance in the inner layers of the arterial wall.

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Efforts should be directed toward detection, concentration, and possible clinical utilization of active principles that govern lipid transportation and local accumulation. The best available evidence makes it seem likely that these active principles are enzyme-hormone complexes and indicates that active metabolic work is performed by the mesenchymal cells in the inner layers of the arterial wall. Much confusion can be avoided by keeping interspecies differences in mind and recognizing the probable stage of atherosclerosis in man at any given age. The three stages leading to clinical disease are fatty streaking in the first two decades, conversion of some fatty streaks to fibrous plaques in the second two decades, and local complications such as hemorrhage and thrombosis about a plaque in the third two decades.

There is some inferential support for this argument in the work of Kellner and Chang [1] and others who found that labeled cholesterol appeared in the subcutaneous lymph of rabbits after intravenous injections or feeding. This tells us that the labeled compound can pass capillary endothelium, but nowhere has visible lipid been demonstrated and it is unwise to assume that endothelium in the turbulent environment of the aorta and large coronary arteries behaves the same as that in the quiet recesses of the capillary bed. One direct attempt to come to grips with the problem has been made by Buck,[2] who studied the inner surface of the endothelial cells of the aorta in rabbits and found that cholesterol feeding resulted in the production of large cisternae in the endoplasmic reticulum of the endothelial cells. This material was not osmiophilic, and it is questionable whether it was truly intracytoplasmic.

There is no doubt that the building stones for the lipids are filtered through the endothelium of the arterial wall and of the vasa vasorum and that elevations of blood pressure probably increase the rate of filtration, but the size, shape, form, and chemical structure of the effective building stones are not known. The bulk of evidence favors lipoprotein moieties, but passive movement of these moieties cannot account for the observation that visible lipid makes its first appearance in the cytoplasm of mesenchymal cells in the inner layers of the arterial wall.

The evidence against filtration is more or less conclusive. The size, shape, distribution, and general appearance of the early lesion cannot be explained on the basis of filtration (fig. 1). On the experimental side two masses of data are, to say the least, difficult to reconcile with concepts of filtration. The first of these has to do with the time interval between cholesterol feeding and the first appearance of lesions. Despite the fact that the blood cholesterol level and the level of the other blood lipids starts to rise within a few days after starting the cholesterol feeding, months must go by before lesions begin to make their appearance—and there is no strict correlation between the height of blood cholesterol level and the extent and degree of lesions. While, in general, it can be stated that some elevation of the blood cholesterol level is prerequisite for lesions, everyone who has worked with experimental animals has encountered some animals that do not get lesions, and the vast majority of humans with atherosclerotic lesions have no known hypercholesteremia or hyperlipemia. The other mass of data is even more damning to the filtration hypothesis. There are several examples of hypercholesteremia and hyperlipemia that have been dissociated from arterial lesions of any kind. Alloxan diabetes,[3] detergents,[4] and Seifter's lipid mobilizing factor [5] are all known to produce marked sustained hyperlipemia and hypercholesteremia with no ensuing arterial lesions of any kind. And the data that attempt to explain the absence of arterial lesions on the basis of cholesterol-phospholipid ratios leave much to be desired.

Fig. 1.—Section of aorta stained with Sudan IV. Fatty streaks and patches appear black. Size, shape, distribution, and appearance of lesions do not suggest filtration as method of local accumulation of lipid.

Local Formation

The evidence for local formation is derived from several sources and is increasing in quantity and quality. Siperstein and co-workers,[6] Werthessen and associates,[7] McCandless and Zilversmit,[8] and others have shown that labeled cholesterol and phospholipid can be recovered from the arterial wall within a period of a few hours after adding carbon-14 acetate or phosphorus-32 phosphate to the perfusion fluid in in vitro experiments or to the diet in in vivo experiments. Thus, there can be no question but that the mesenchymal cells in the arterial wall are capable of taking these simple building stones and fabricating lipids from them. Morphologic and

histochemical studies on the calf aorta perfused with C^{14}-labeled acetate have confirmed the presence of intracellular and extracellular sudanophilic and osmiophilic lipid after an unexplained lag of about 48 hours.[9]

The gross appearance (size, shape, and distribution) of such lesions as are seen in figure 1 (from a 21-year-old man who died from malignant lymphoma) is admittedly difficult to explain by any mechanism but that of local formation. The curious patchy, speckled, and streaky lesions and sometimes even the serpentine distribution of the lesions, with varying degrees of elevation above the surface and varying amounts of lipid,[10] are no more difficult to explain than are the distribution, size, and shape of the areas and nodules of adenomatous hyperplasia in the thyroid, prostate, adrenal, breast, and ovary. All are compatible with the vagaries of end-organs in response to hormonal imbalance and are less confusing when viewed in the light of local affinities and proximities to source materials, i. e., of end-organs, which may be competing for priorities or may be imbalanced in many ways. Thus, it is possible to consider the mesenchymal cells in the arterial wall as target organs for hormones, and the size of these potential end-organs has been estimated.[11] The findings of Ingenito and associates [12] of a specialized cell in the myocardium and possibly in the intima of the arterial wall, if confirmed, would constitute additional evidence for this hypothesis.

Another unexpected finding has focused our attention on these possibilities. In about 2% of infants (less than 3 years of age), with aortas that were entirely negative for fatty streaks after gross Sudan staining, fine sudanophilic droplets in the cytoplasm of isolated cells or scattered small groups of cells in the inner layers of the arterial wall have been seen on histological and histochemical study of frozen sections of "representative" areas.[13] Many of these cells occupy the position and have the appearance of smooth muscle cells. Thus, we have seen intracellular lipid without extracellular lipid but never the reverse, and this again emphasizes the role of the mesenchymal cells in the earliest stages of atherogenesis and supports the concept of local formation.

To us, the most impressive evidence for local formation is derived from studying hundreds of aortas, coronary arteries, and other arteries collected from various parts of the world; data from accidental deaths were obtained from medicolegal laboratories, and data from deaths due to natural causes were obtained from routine autopsy services in large general hospitals in metropolitan areas (New Orleans; Guatemala City; San Jose, Costa Rica; San Juan, Puerto Rico; Cali, Colombia; Bogota, Colombia; London; Madrid; Barcelona, Spain; and Durban, Union of South Africa). Practically everyone beyond the age of 3 years has shown some degree of fatty streaking of the aorta, and this has been confirmed by gross Sudan staining and microscopic study. The similiarity in the pattern of development of fatty streaks in regard to age in various parts of the world has been striking.[14] Individual differences in each of the areas are marked, but the composite picture for each area is similar to that of other areas—despite the marked variations in genetic background, diet, climate, habits, indigenous diseases, and other factors. It is difficult to believe that each of these persons has consumed too many calories, too much fat, too little protein, too much or too little animal fat, or too much or too little unsaturated fat or that each has had hypertension or some other disturbance that could have left scattered "scars" in the arterial wall that predisposed to differential filtration. It is easier to believe that the arterial wall normally forms and turns over to the metabolic pool lipids not unlike those in the circulating blood and that local imbalances in this normal mechanism result in the local accumulation of lipid that constitutes the first stage of atherosclerosis.

Evidence against local formation is indirect and consists largely of the fact that mesenchymal cells (smooth muscle cells, fibroblasts, and phagocytes) in other parts of the body do not form and accumulate lipids except under special conditions, as exemplified by xanthelasma and xanthoma tuberosum. It must be remembered, however, that the arterial wall is the only pulsatile organ in the body, and this turbulent environment—created by a primary pulse from the lumen and a counter pulse from the vasa vasorum—must afford opportunities for physicochemical activity that are lacking or limited in other parts of the body.

In summary, the logic for filtration and against local formation is far outweighed by the increasing number of direct observations supporting local formation and opposing filtration. The arterial wall is an organ in its own right and should be recognized as such.

Comment

Let us turn now to some of the implications and possible applications of this newer approach to the pathogenesis of atherosclerosis. Two forces are at play: lipid accumulation and reaction to these lipids. This reaction may be (1) superficial, as by incrustation of fibrin (Rokitansky and Duguid), or (2) deep (fibrosis, necrosis, hyalinization, and calcification). The first of these forces is the first stage of atherosclerosis (fatty streaking), and the second constitutes the second stage of atherosclerosis (fibrous plaques).

A third force may come into play, namely, complication of lesions, which constitutes the third stage of atherosclerosis. This may be of local or of systemic origin. Among the local factors that are recognized, these can be listed: hemorrhage due to local vasoconstriction about the margin of one or more fibrous plaques, softening of one or more

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plaques with ulceration and thrombosis, and embolism (rare). At least two systemic factors are recognized: accretion of additional lipid (related to stage 1) on the surface or about the margins of one or more fibrous plaques and variations in the coagulability of the blood. Whether clinical disease, the fourth stage of atherosclerosis, becomes manifest will depend on the size of the vessel involved, the rate and degree of occlusion of its lumen, and the potential for collateral circulation about the point or points of constriction.

Thus, in order to understand the natural history of this protean disease, it is essential to recognize that different factors may be responsible for the different stages of atherosclerosis. Much confusion has arisen from translation of data among various species of animals and failure to keep proper perspective on the various stages of atherosclerosis. For example, reference is frequently made to the fatty streaks in the aorta and coronary arteries of cholesterol-fed rabbits or chickens with the inference that these data might be pertinent to clinical coronary artery disease in man. Not only does this type of reasoning ignore interspecies caution but it refers the first stage of atherogenesis in one species to the fourth stage of atherosclerosis in another species. Even if the enzyme systems and other mechanisms for lipid transport in the two species were the same—and there is ample evidence that they are not—there still remains the probability that lipid transport has little or no effect on the final episode (complication of one or more strategically located fibrous plaques by hemorrhage or thrombosis) that precipitates the clinical coronary artery disease. We do not wish to belabor this point too much, for there is the possibility (albeit an improbability) that accretion of additional lipid on the surface of a fibrous plaque could be the mechanism of final narrowing to the point of clinical coronary artery disease. Thus, it is conceivable that persistence in the use of these factors which discourage lipid accumulation in the arterial wall could favorably affect the fate of some of the fibrous plaques in the coronary, cerebral, and other arteries. But it is not fair to expect this mechanism to prevent the common complications (hemorrhage and thrombosis) that precipitate clinical disease.

Much of this confusion can be avoided by observing interspecies caution and recognizing the probable stage of the disease in man at any given age. In general, it can be stated that the first two decades of life are concerned with the first stage (fatty streaking), the second two decades with the second stage (conversion of some of these fatty streaks to fibrous plaques), and the third two decades with the third stage (complication of lesions) of atherosclerosis (fig. 2).

But to return to the major thesis, how does lipid accumulate in the arterial wall? There is a growing body of evidence indicating that active metabolic work is performed by the mesenchymal cells in the inner layers of the arterial wall, that the arterial wall is indeed an organ, and that it is a potential target organ for hormones or hormonal imbalance.

Enzymes in the mesenchymal cells in the inner layers of the arterial wall must come into play before visible fat makes its appearance. It is probable that similar enzymes effect the transport of lipid moieties across the endothelial barriers, but it is strange that visible lipid has not been observed in the cytoplasm of endothelial cells. There is ample evidence that the simplest of building stones, labeled acetate and phosphate, can be utilized for fabrication into cholesterol, phospholipid, and other lipids by the perfused, sliced, or in situ aorta. There is no question about the ready diffusibility of these ions, but it is by no means certain that the major portion of lipid transport across the arterial wall occurs in this form. Thus, the problem is basically one of the relative importance of the transport of lipoproteins versus the transport of more simple molecules. And it is probable, from the natural history of the process of lipid accumulation and the ready dissociation between lipid concentration in the blood and lipid accumulation of the arterial wall, that lipoproteins must be enzymatically dissociated before passing the endothelial barrier and bathing the mesenchymal cells in the inner layer of the arterial wall.

STAGE 1	STAGE 2	STAGE 3	STAGE 4
Fatty Streak →	Fibrous Plaque →	Complications of Lesions →	Clinical Disease
0-19 years	20-39 years	40-59 years	over 40 years
Due to local accumulation of lipid (and/or enzyme-hormonal control ?)	Reaction to accumulation of certain lipids (and incrustation of fibrin ?)	Hemorrhage Thrombosis Aneurism Embolism Calcification	Myocardial infarction Stroke Gangrene

Fig. 2.—Concept of pathogenesis of atherosclerosis.

In summary, then, it would seem that the emphasis should be shifted to active metabolic work and that efforts should be directed toward the detection, concentration, and possible clinical utilization of active principles that govern lipid transport and local accumulation. The best available evidence points to these active principles being enzyme-hormone complexes.

Summary

Enzyme-hormonal principles that govern lipid transport at the cellular level appear to play a greater role in lipid accumulation in the arterial wall (stage 1 of atherosclerosis or fatty streaking) than do physicochemical factors governing filtration through the arterial wall. Other factors come into play in the subsequent development of these early lesions through stage 2 (fibrous plaques) and stage 3 (complication of lesions, as by hemorrhage and thrombosis) to stage 4 (clinical disease). Much confusion regarding human atherosclerosis can be

avoided by observation of interspecies caution and recognition of the probable stage of the lesions in man at any given age.

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PATIENTS WITH MULTIPLE INJURIES.—There were 9,500,000 accidental injuries in this country in 1957, with 95,000 deaths. . . . With increasing frequency we are confronted with persons injured in two or more sites and possibly affected in two or more body systems. The immediate problem is then saving life, to be followed after first aid by determination of the order of care of the various injuries in such a way that first things are done first. This can be accomplished only by organization. . . . The important factor in this organization is the team captain. In a large hospital this should be preferably a general surgeon, not a specialist. In a smaller community hospital it might well be a general practitioner. The function of the team captain is to take complete charge of this multiple injury patient. He should call on whatever specialists are required, but the treatment which they recommend should not be instituted until the captain orders it at a time when he believes that the patient can stand it. . . . It is the team captain's duty to remain with this patient constantly for as many hours as are required, giving all the orders, seeing all the x-rays and laboratory reports, discussing viewpoints with the specialists, changing the order of procedures as changing conditions require. This one man must accept the responsibility for the life of this patient. It is no place for two attending physicians or an attending physician and a resident to be both ordering, possibly at cross purposes. . . . Trauma and the first principles of its management . . . is not a specialty and it should not be, since it cuts across all parts of the human body. . . . With the extensively injured, no rules can be laid down to cover all cases, but there are certain principles to guide us, thereby not adding surgical trauma until it can be tolerated and not delaying reparative surgery until the progress of infection becomes more than the body can cope with.—R. H. Kennedy, M.D., The Appraisal and Management of Patients with Multiple Injuries, *The Surgical Clinics of North America*, December, 1958.

THE CLINICAL RADIOLOGIST AND THE PROBLEMS OF RADIATION HAZARDS

Wendell G. Scott, M.D., St. Louis

Mankind must learn to live safely in the artificial environment that is being created by the atomic industrial revolution. That this can be done is illustrated by the fact that 38 million radiologic examinations are done annually in the United States alone; diagnostic radiology is indispensable, and if it contributes to the shortening of life span and production of genetic damage such effects have not made themselves evident. The problem is first to understand and second to minimize the effects that can arise from diagnostic radiologic examinations. During the first 30 years of life the gonadal dose should be strictly limited according to published recommendations; in the later years of life, beyond the reproductive period, the gonadal (genetic) effects are of no clinical significance. However, exposure to ionizing radiation should be minimized by methods outlined here. People should not be frightened by confusing diagnostic radiology with thermonuclear warfare and should learn that the safe use and control of medical radiation depends on properly educating its users in the underlying sciences.

This is the nuclear age. From the time man first utilized fire, he has struggled to develop and then to master each new and more powerful source of energy. Significantly, he has also learned to protect himself from the hazards generated by them. Man is certain to do the same with the power and radiations arising within the atom.

We have been living in the formative period of the nuclear era for 16 years. The problem today is one of control of radiations so that man can live safely in the artificial environment which the atomic industrial revolution is creating. In essence, we must prepare now to safeguard a brilliant future by keeping all forms of ionizing radiation at the lowest possible level.

Public Health Aspects

The public health aspects created by the nuclear age are the responsibility of the medical and allied professions. The leadership in the medical use of radiations has logically devolved on the radiologists, the radiation physicists, the radiobiologists, the health physicists, and the geneticists. Their representatives constitute the National Committee on Radiation Protection as well as the International Commissions on Radiation Protection and on Radiological Units and Measurements. Since 1931, these bodies have formulated the standards for the safeguarding of patients, occupational personnel, and the public. Their recommendations have proved to be fully protective, practical in application, and effective without legislation—a remarkable record.

The work of these bodies provided the foundations for the handbooks on radiation of the National Bureau of Standards. These contained most of the recommendations emphasized in the 1956 reports of the National Academy of Sciences on "The Biological Effects of Atomic Radiation" [1] and of the British Medical Research Council on "The Hazards to Man of Nuclear and Allied Radiations." [2] These reports served to focus the attention of the public on this subject, to publicize the genetic hazard that can accrue from small amounts of radiation, and to intensify the efforts of the medical profession to minimize radiation dosage from the use of x-rays.

Volume of Diagnostic Radiologic Examination.—Diagnostic radiology has had a tremendous growth because of the great contributions it has brought to the health and well-being of mankind. This was not due to accidental circumstances. It came about because it was and still is the means for lifting the cloak of uncertainty from medicine. Nearly every practicing physician either directly or indirectly utilizes the indispensable advantages offered by diagnostic radiology for the benefit of his patients. The total number of radiologic examinations and the films consumed per year are in the millions. Estimated annual numbers are as follows [1b]: 38 million roentgenographic examinations, with 32 million by radiologists; 118 million sheets of film; 13 million fluoroscopic examinations, with less than half by radiologists; 3 million photofluoroscopic examinations in hospitals; 189 million packets of dental films; 15 million to 18 million square feet of industrial film; and 128,000 roentgen ray machines, with 50% owned by dentists and 50% by physicians, osteopaths, chiropractors, and chiropodists (about 50% of general practitioners own diagnostic x-ray equipment, and the number of physicians owning equipment increased 50% from 1949 to 1955).

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Chairman's address, read before the Section on Radiology at the 107th Annual Meeting of the American Medical Association, San Francisco, June 25, 1958.

To keep these figures in the proper perspective, let us not forget that the great bulk is made on sick people, on those seriously ill with an obviously short life expectancy, and on those over 30 years of age. Nor should we overlook that during the past 50 years, simultaneously with the expansion of diagnostic radiology, the life expectancy increased from 49.2 to 68.07 years; the death rate from tuberculosis dropped from 194 to 9.1 per 100,000; infant mortality fell from 99.9 to 26.4 per 1,000 live births; and fetal deaths dropped from 23.9 to 17.1 per 1,000 live births. Also, American children today are said to be taller and healthier and have a lower death rate than before. Stone,[3] who assembled these statistics, points out that while radiology cannot lay claim to being the major reason for these great medical achievements it played a conspicuous part. His inference is that if radiations of this order contribute to the shortening of the life span and produce genetic damage they have not made themselves evident.

Deleterious Effects of Radiation.—In the assessment of the possible deleterious effects arising from the medical and dental use of x-rays, it must be clearly understood that (1) only small doses of radiation are used in clinical examinations and (2) the exposures are limited to local or segmental areas of the body as opposed to total-body irradiation. Many of those who emphasize the bad effects of diagnostic exposures do not distinguish between local and total-body radiation. The "roentgen" is the measure of exposure to each gram of tissue, and 1 r to a toe is vastly different than 1 r of total-body exposure.[3]

The deleterious effects of radiation of this order fall into two broad categories: (1) the somatic effects, which depend on the exposure to the body tissues and are primarily of immediate concern to the individual person, and (2) the genetic effects, which depend on the exposure to the gonadal tissues and are of long-range concern to the human race.

Somatic Effects of Radiation

Shortening of Life Span.—A somatic effect which has created consternation is the life-shortening in animals which have received whole-body irradiation. However, it has not yet been shown to result from low doses of the order of background radiation or from those used in diagnostic examinations, nor has it been shown to occur from segmental or partial-body irradiation. It has been described as an acceleration of the aging process rather than as a consequence of a specific radiation lesion. This complication apparently has a direct dose-size relationship, but such data are not available for man.

In 1956, Whipple [4] warned that a person who received the maximum permissible exposure of 0.3 r per week would accumulate a total dose of 468 r in 30 years, which might reduce the life expectancy of the exposed person about three years. Russell's [5] data from mice suggest that a continuous exposure at the rate of 15 r per year might result in a 3 to 5% shortening of the life span. Jones [6] estimated the life-shortening in man from exposure to radiation as 15 days per roentgen—a figure much higher than that of others. More recently, Failla [7] estimated a shortening of approximately one day per roentgen of accumulated dose from chronic exposure at a dose rate not in excess of 0.5 r per day, which amounts to three-fourths of a year.

Warren [8] concluded that radiologists die on the average of 5.2 years earlier than do other physicians. After a careful appraisal of Warren's data, Seltser and Sartwell [9] stated: "That the average age of radiologists at death is younger than that of other physicians cannot be ascribed to their exposure of ionizing radiation, since differences in age composition alone can account for the finding." A recent survey by Brown and Doll on 1,377 British radiologists confirms this opinion, for they conclude: "The expectation of life of British radiologists is similar to that of other men of comparable status and has not been substantially altered by their occupational exposure to radiation." From studies on radiation exposure to radiologists, Braestrup [10] concludes, "If reduction in life-span is proportional to the dose received, it may be inferred that radiologists using present safeguards, do not need to fear any significant future reduction in their life-span due to irradiation."

Leukemia.—Another somatic effect of concern is the possibility of inducing leukemia. For a reason as yet unknown, it has shown a real increase in incidence in the past 20 years. The suspicion that the expansion of diagnostic radiology may be related to this increase arose from the following observations:

Leukemia can be induced in animals as a result of large doses of whole-body exposure to radiation. Deaths from leukemia among U. S. radiologists are reported to be 10 times that of other groups of physicians, based on 8 cases in 173 radiologists over a 15-year period (1929-1943).[11] In England between 1935 and 1954, a total of 13,352 patients were given radiation treatment with large doses for ankylosing spondylitis and 38 cases of leukemia appeared.[12] In 1,400 infants and children who received deep x-ray therapy for "thymic enlargement" over a 25-year period, 7 cases of leukemia were found (1926-1951).[13] The incidence of leukemia in the 98,000 survivors of the atomic blasts near the hypocenter at Hiroshima City was 12 times greater than those at the periphery. The total number of known cases of leukemia among the 194,000 exposed survivors at Hiroshima and Nagasaki up to 1955 is 93.[2] No cases of leukemia have been reported during the first decade in Japanese children who were irradiated in utero by the atomic bomb. Stewart and associates [14] reported that children of mothers who received radiation exposure to the abdomen from diagnostic procedures while preg-

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nant developed leukemia nearly twice as frequently as the controls—42 as compared to 24. In this situation, the fetus received total-body irradiation. However, in those mothers who had diagnostic x-ray examinations of other portions of the body there was no increase in the number of children developing leukemia.

This is a total of 188 people developing leukemia after total-body or near total-body irradiation, 93 of whom were irradiated by atomic bombs. This is a small number on which to base sweeping conclusions and is inadequate to establish the linearity effect of radiation in leukemia. Lewis,[15] however, ably presents the argument in favor of this concept.

Of equal importance in assessing the leukemogenic effect of radiation is the series of 640 women treated by Kaplan [16] for infertility by irradiating the ovaries; in neither they nor their offspring for two generations have leukemia, lymphoma, or cancer developed. Likewise, no cases of leukemia have appeared in Arneson's series of 350 women with primary carcinoma of the cervix who have been studied 5 to 20 years; all received heavy external x-ray radiation and local radium treatments.

Brues, discussing the somatic mutation theory as the cause of leukemia, states: "There must be something besides one mutation in one cell. Maybe it might be in two or three mutations in the same or adjacent cells in which case it would not be a linear relation. It might possibly be a combination of things with which radiation has nothing to do. We just don't know."

In summary, it is evident that total-body irradiation by either large single or cumulated doses causes an increased risk of developing leukemia, and unnecessary exposure to ionizing radiation should be avoided. We have no precise knowledge of the incidence of leukemia under conditions of chronic exposure. The somatic effects from radiation present an ever-constant threat to occupational personnel but pose only a remote threat to the patient undergoing a diagnostic examination; those who have followed the recommended precautions and the directives on protective barriers have not sacrificed any appreciable period of their life span or incurred a serious risk of developing leukemia.

Genetic Effects of Radiation

The problem, then, is first to understand and second to minimize the genetic effects that can arise from diagnostic radiologic examinations. The inheritance mechanism is by far the most sensitive to radiation of any biological system in the human body. To quote from Glass [17]:

> One must begin to think of mutations of the hereditary material in terms of its chemical nature. . . . Chromosomes, the carriers of the genes, are composed of deoxyribose nucleic acid (DNA), some ribose nucleic acid (RNA), a considerable basic protein (histone), and a little protein of a higher molecular weight. The evidence indicates that the genetic information is coded primarily in the DNA. . . . Mutations are alterations in this material which, when chromosomes reproduce themselves, are themselves replicated and thus transmitted through mitotic cell divisions.
>
> The hereditary material is of course present in the nuclei of all cells, not of reproductive cells alone. Any damage done to it is transmitted through mitoses to all the somatic descendant cells. Many, if not all, genes are concerned with presence and specificity of particular enzymes, each of which governs some particular step in the metabolic pattern. When a mutation impairs the specificity of an enzyme and thereby blocks a particular metabolic step, the usual outcome is fatal unless the cell has some alternative way of supplying its needs. . . . This is not serious if there are uninjured cells to take its place. Only if the damaged cell is irreplaceable, or stimulated to abnormal activity and multiplication at the expense of other cells, such as in leukemia or cancer, is the fate of the entire organism imperiled. If great numbers of somatic cells are damaged genetically, the effect may be severe, even though not uniform in character. Thus, most mutations do not result in conspicuous abnormalities, but are manifested as increases in the types of abnormalities, disease, and death that are already occurring.

Furthermore, radiation acts blindly, not selectively, on certain genes and not on others, which explains why the vast majority of mutations are deleterious. In genetic damage to the reproductive cells, the hereditary defect will be present in every cell of the offspring to whom it is transmitted via egg or sperm and no tissue can escape the consequences of the defect. The sole safeguard in each of such cases is the general probability that the set of genes inherited from the other parent will not carry the same defective genes.

It is not possible to make a simple, noncontroversial statement concerning the implications for man of the genetic effects of radiation. There is, however, general agreement among geneticists on the following basic concepts which have been extrapolated from data on the fruit fly and mice: 1. Apparently no threshold dose is required to produce a deleterious effect. 2. Once damage is done, it is largely irreversible. 3. The effects are probably cumulative over the years. 4. The result of genetic damage is to produce deviations from the norm in the offspring of the irradiated parents. 5. These deviations or mutations are almost always undesirable. Their offspring are called mutants. 6. Mutations produced by radiation are in no way different from mutations which have always been occurring in the human race. 7. The mutants are characterized in general as follows: decreased longevity, increased susceptibility to disease, decreased fertility, and usually recessive or masked so that the first-generation offspring do not bear the full brunt of the genetic damage. Thus, contrary to public opinion, freaks and monstrosities do not often occur in the first generation after a mother is irradiated. Usually the deviations caused by the damaged gene in the first offspring are so minute and subtle that recognition is extremely difficult. The full expression of the damage comes in subsequent generations when there is a mating of those with similarly damaged genes.

There is a certain level in the mutation rate which is known to be normal for the human species. The concern of the geneticists is that this level may be significantly raised from the widespread and increasing use of ionizing radiation. It has been estimated from Drosophila flies and mice

TABLE 1.—*Seven Types of Examinations Yielding Surface Dosage in Excess of One Roentgen over Gonads**

Examination	r†
Angiocardiography	1.5
Excretory pyelography	2.25
Pelvimetry	4.9
Lumbosacral spine	5.4
Upper gastrointestinal (fluoroscopy plus roentgenography)	5.7
Routine spine	5.9
Hip and pelvis	8.8

* Data from Hodges.[18]
† Doses are given as surface values, and, obviously, gonadal doses are measurably less, especially in the female.

experiments that a gonadal dose of 30 to 60 r to each person in the entire population would result in a doubling of the normal mutation rate. The geneticists fear that such a possibility would be disastrous for the perpetuation of the race. Remember that the geneticists are interested in total population doses, i. e., "x" millions of roentgens per "y" millions of persons in the reproductive age. Persons beyond the reproductive age can have roentgenographic examinations without fear of genetic damage.

The Committee on Genetic Effects of Atomic Radiation of the National Academy of Sciences [14] recommends that during the first 30 years of life the average gonadal dose for large populations should not exceed 10 r of man-made radiation plus the 4.3 r from the natural background sources. Persons should not receive a total cumulative dose to the reproductive cells of more than 50 r up to the age of 30 and not more than another 50 r, or a total of 100, to the age of 40.

It would be of great help in determining the extent of the genetic problem if we knew the average gonadal dose the population was now receiving from medical and dental sources and how it compares to natural background radiation. Laughlin and Pullman [15] attempted to do this by a survey of the literature and estimated it to be 4.6 r ± 3 in a preliminary report that has not been officially released by the National Academy of Sciences. This figure is based on data of varying reliability. The report in October, 1957, by the International Commission on Radiological Protection and International Commission on Radiological Units and Measurements states, "Enquiries up to the present have not revealed any records detailed enough to use for the proper assessment of the gonadal doses to the population," and concludes, "Consideration of methods of arriving at the genetically significant annual gonad dose, to the population from medical exposures is the most important immediate objective." In a subsequent paper, Laughlin and associates discuss the studies and surveys that are required for obtaining the necessary information to develop this figure. The United Nations Scientific Committee on the Effects of Atomic Radiation requests the cooperation of the medical profession in supplying records for this purpose. Until this is done and an accurate estimate of the genetically significant gonad dose determined, we must be extremely cautious about accepting or formulating quantitative inferences from diagnostic x-ray procedures. Sonnenblick reminds us that those "which have appeared in scientific literature and publicized in mass media can only be regarded as 'best guesses' and conclusions drawn cannot be considered as definitive." In other words, one must be most careful in the interpretation of studies on uncontrolled data.

To summarize, the science of genetics has become of clinical importance. Ionizing radiation in small doses unquestionably can increase the mutation rate in the hereditary material and any increase in the mutation rate is undesirable for the human race. No matter what the present average gonadal dose is, it is too high if it can be lowered.

Means of Reducing Gonadal Exposure

These conclusions are not a pronouncement of doom for radiology. They are a challenge and a stimulus to do a better and a more careful job. Just as there are advances in other fields of medicine from the development of new knowledge and ideas, so there are in genetics and radiology. New roentgenographic techniques and procedures have to be developed, old ones modified, and others discarded. With use of present-day developments radiation dosage from the medical use of x-rays can be reduced by 75 to 85%.

It can be accomplished while preserving the value and without impairing the efficiency of the diagnostic examination. To bring this about, it is necessary that physicians have a sound understanding of the hazards as well as a knowledge

TABLE 2.—*Frequency of Utilization of Examination Carrying High Gonadal Dosage, 1956-1957**

Examination	Times Used	Patients Aged Under 30 Yr. No.	Patients Aged Under 30 Yr. %
Upper gastrointestinal	4,804	602	12.5
Routine spine	1,132	260	23.0
Lumbosacral spine	2,122	544	25.5
Excretory pyelography	1,795	525	29.0
Hip and pelvis	2,538	900	35.5
Pelvimetry	370	260	70.0
Angiocardiography	147	115	78.0

* Data from Hodges.[18]

of how to use diagnostic radiology and how to employ protective measures. To aid in this undertaking, the American College of Radiology (aided by a grant from the Rockefeller Foundation) has distributed to all practicing physicians "A Practical Manual on the Medical and Dental Use of X-rays

with Control of Radiation Hazards" (copies of this manual may be obtained by writing directly to the American College of Radiology, 20 N. Wacker Dr., Chicago). It is well for physicians who do fluoroscopic and roentgenographic examinations to realize that they have a greatly increased liability because of the possibility of inducing genetic damage by radiation.

The physician who first examines the patient assumes the responsibility for determining if the possible benefits of the examination outweigh the possible hazards. If in doubt, he should consult his radiologist. This is a just responsibility of the attending physician and one which must not be compromised or restricted by the enactment of legislative controls. Above all, we must not forget that our primary concern is with the welfare of the patient. The health of future generations is based on the health of the present generation.

Fortunately, about 85% of the total diagnostic (gonadal) dose arises from six or seven types of examinations, which constitute only about 10% of all examinations. Hodges [18] found that only seven standard procedures exposed the gonads to radiation in excess of 1 r per examination and that these constituted only 20% of his annual total of 64,076 examinations. Table 1 is a list of these procedures arranged in order of magnitude of gonadal dose.

In table 2 is listed the frequency of the seven examinations carrying high gonadal dose arranged in the order of increasing numbers of those that are given to patients below the age of 30. These total 3,215 cases, or only 5% of the total of 64,076 examinations, indicating that only a small percentage of roentgenographic examinations are performed on persons under 30 years of age. They are only a few patients in any one working day, and so their protection with gonadal shields does not constitute a burden for the staff.

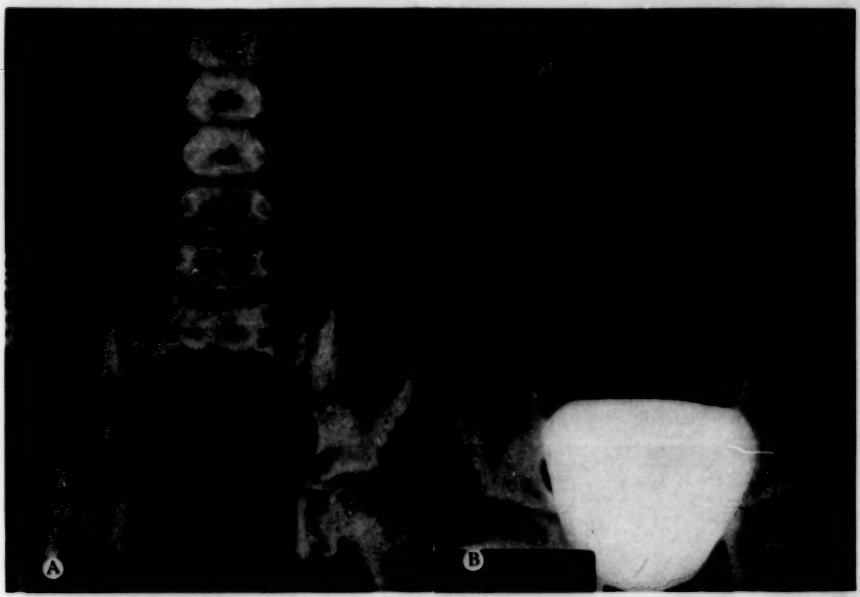

Fig. 1.—*A*, preliminary roentgenogram of urinary tract of 12-year-old girl prior to intravenous pyelography (made without gonadal shield for detection of possible urinary calculi). *B*, subsequent pyelograms made with lead shield cut out to cover pelvic inlet to reduce radiation exposure to ovaries.

The adoption of three fundamental practices can result in an appreciable reduction in the gonadal dose: 1. Diagnostic examinations should be performed by physicians with training in radiology and by experienced x-ray technicians. The examinations must be of standards acceptable to other physicians to whom the patient may be referred to avoid having the examination repeated. 2. Written reports and films of each examination must be preserved so that they may accompany the patient if he is referred to another physician, hospitalized, or transferred to another city. 3. The

initial examination should be made carefully. The patient should be properly posed, and he should be kept under control to avoid unsatisfactory films and the necessity of retaking them.

Fig. 2.—Collection of various devices for shielding gonads: testicular shield on adjustable stand (Hodges); molded lead cup for shielding testes (may be tied in place to permit placing patient in various positions); lead sheet cut out to conform to pelvic inlet for ovarian shield; heavy lead-rubber sheeting (used for same purpose); and rectangular lead-rubber sheets, used in many examinations as gonadal shields in either males or females.

A guiding directive for lowering gonadal dose might be as follows: Scrutinize every examination for ways of minimizing gonadal dosage. With this objective in mind, let us see what can be done at the present time.

First, consider the appropriateness of the examination and equipment: (*a*) have a solid reason for the examination—it is doubtful if many unnecessary examinations are being done because the need is being more carefully evaluated and the extype so that the patient must pay for a portion of the initial examination; (*d*) limit fluoroscopy to specific purposes, especially in children, for it yields the highest gonadal dose, the gonads are more difficult to shield, and it can result in whole-body irradiation to infants—keep in mind that one minute of continuous fluoroscopy can be equivalent in radiation to 400 chest films; (*e*) have a radiation physicist survey your roentgenographic and fluoroscopic equipment for possible "leaks," obsolescence, output in roentgens, adequacy of protective barriers, and provisions for protection of occupational personnel; and (*f*) teach x-ray technicians the importance of lowering gonadal exposure—they must know the "why" for each factor employed because the largest exposure reduction results from the correct technique the first time without having to make corrections and repeat the examinations.

Second, reduce the quantity and improve the quality of the x-ray beam (reduce entrance skin and integral dose) by the following means: (*a*) addition of 2 mm. of aluminum filtration to roentgenographic tubes and 3 mm. of aluminum filtration to fluoroscopic tubes (gain in dose reduction 50%+); (*b*) increase target-film distance to 36 or 40 in. for roentgenographic work and target-table distance for fluoroscopy to 18 in.—the increased distance produces less exposure to the patient in relation to the amount reaching the film or screen (gain in dose reduction 10%+); and (*c*) collimate diagnostic beam to the smallest area that covers the part to be examined—adjustable multileaf diaphragms with rectangular apertures can reduce stray radiation as much as 20 to 30% over circular cones—and, in this connection, we

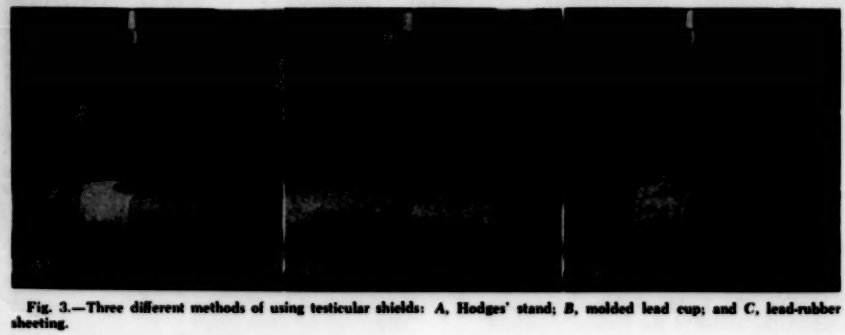

Fig. 3.—Three different methods of using testicular shields: *A*, Hodges' stand; *B*, molded lead cup; and *C*, lead-rubber sheeting.

pense serves as a deterrent; (*b*) take only the films that are required to elucidate the examination—eliminate nonessential views; (*c*) discourage health-insurance policies that include "free" x-ray examinations, and encourage policies of the deductible must continue our efforts to develop techniques that will provide objective evidence on the roentgenogram that the exposure was confined to the area under investigation (gain in dose reduction 15-30%).

Third, increase effectiveness of film dose by the following means: (*a*) use the new film with fast emulsion (gain in dose reduction 40-50%); (*b*) use high-speed intensifying screens (gain in dose reduction 40-50%)—fast films plus high-speed screens alone can yield a 75% reduction; and (*c*) process films with time and temperature control with use of the recommended chemicals for fast film (Spenodone hydroquinone developer reduces film dose 20%) (gain in dose reduction 5-20%).

Fourth, investigate use of special equipment: (*a*) phototiming, which is of decided help in preventing overexposure and underexposure and, therefore, in decreasing the number of reexaminations, and (*b*) fluoroscopic image intensifiers, advantageous in reducing exposure to both patient and operator in prolonged fluoroscopic studies, such as in cardiac catheterization and myelography.

menstrual period to preclude the possibility of irradiating the embryo and (*b*) when possible, delay abdominal and pelvic exposures on pregnant women until the last trimester.

Comment

The careful exercise of these practices not only will materially lower radiation dosage to the germinal tissues but will avoid a severe restriction of survey examinations in public health and permit the inclusion of new radiologic procedures that will be developed in the future. The purpose of this study is to show how the dosage can be lowered for almost all examinations. It is not a plea to reduce the number of radiologic examinations below that required for the highest quality of medical practice but to support their utilization through a lowering of the gonadal dosage.

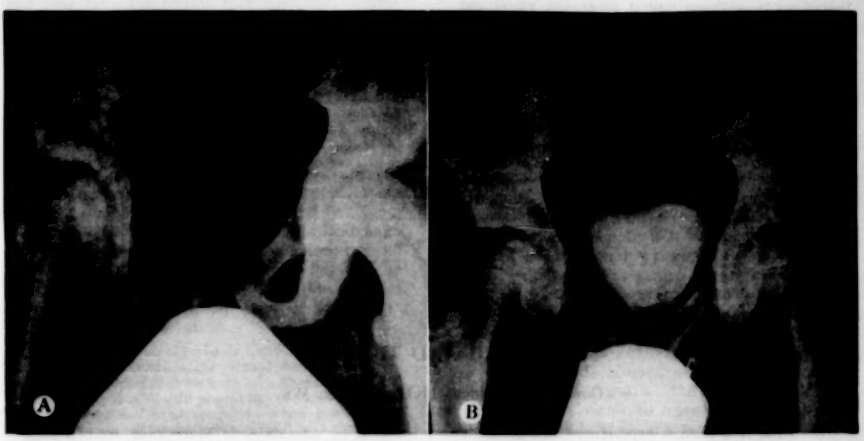

Fig. 4.—A, roentgenogram made with Hodges' testicular shield in place. It does not obscure bones of pelvis or hinder examinations of hips and femurs. *B*, roentgenogram made with molded lead cup in place, obscuring only small area of inferior pubic rami, yet affording complete visualization of hip joints and bladder for cystograms, as in this case, and not obscuring information in intravenous pyelograms.

Fifth, utilize gonadal shielding devices (fig. 1): (*a*) lead, lead-rubber, or lead–glass-fiber sheets or aprons or lead barriers to cover the pelvis for most radiographic procedures (fig. 2) and (*b*) special devices as shown in figures 3 and 4—adjustable tripod stand (Hodges), molded lead cups for males, lead or lead-rubber cutouts conforming to pelvic inlet for females (fig. 1), and lead-rubber snap-on diapers for infants (considerable gain in dose reduction).

Sixth, note special protective measures for pregnant women (30% of all gonadal dose comes from obstetric radiography): (*a*) reduce to a minimum roentgen exposures to the pelvic area of women in child-bearing age in the two weeks after the last

Conclusions

The time has arrived to (1) develop a calm and mature attitude toward the nuclear era, an era that holds great promise for the betterment of mankind; (2) put an end to the psychological scare about medical radiation and stop confusing it with thermonuclear warfare, with acute massive or chronic whole-body irradiation, and with the restrictions for those occupationally exposed; (3) have every physician using diagnostic radiology exert positive efforts and means to keep radiation dosage to the gonads to the lowest level consistent with the best standards of medical practice (as radiologists, we must set the example); (4) acknowledge that

radiation to the germinal tissues can be reduced by 75 to 85% without impairing the efficiency of diagnostic examinations; and (5) realize that the key to implementing the safe use and control of medical radiation lies in the education of all practicing physicians in the fundamentals of genetics, radiobiology, and radiology.

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V. 1

RESEARCH AND TRAINING

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Education is a human experience, and methods of training are many and varied. Medical education, perhaps better than any other field, illustrates the progress of teaching through the years—how new ideas and methods developed and how the best of them were carried forward and augmented by later ideas and methods.

History of Medical Education

Dr. William S. Middleton traced this history some years ago, when he was dean of the University of Wisconsin Medical School, from its origin in the priesthood of antiquity to the modern medical school. In the evolution of Greek culture, medicine was eventually separated from the priesthood. The first medical school at Alexandria, founded by Alexander of Macedonia, trained such notable medical figures as Herophilus, Erasistratus, and Galen. With the Roman conquest of Egypt, the school at Alexandria was disbanded, and it fell again to the church to bridge the gap until the establishment of the next formal medical school at Salerno in the ninth century.

The torch of medical education lighted at Salerno was kept bright for at least four centuries, but its decline Dr. Middleton put at the 13th century when the medical leadership passed in turn from Bologna to Naples to Montpellier to Paris. True academic tradition in pageantry and form dates from the University of Paris. In France, surgery was separated from medicine. Leyden, Edinburgh, and London gained ascendancy in medical education in the late 17th and 18th centuries. The first medical school in North America was estab-

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lished at the College of Philadelphia in 1765. Until then, an apprenticeship system of medical education had prevailed in the United States.

While formal medical education showed a mushroom growth in the 19th century, the pattern of medical apprenticeship persisted in varying degrees throughout this period and, in a changed and restricted form, does today. The opportunity to read in an established physician's office was a coveted method of introduction to the study of medicine almost to the end of the 19th century in this country.

The formula for the first organized courses of medicine in America, Dr. Middleton reported, differed in no wise from the European or the British pattern. Classroom lectures and demonstrations were the rule. Personal dissection by the medical student was the exception.

Yet, among the leaders in medical thinking, there had long been the feeling that laboratory work—research if you will—was a vital part of medical instruction. This I have on the authority of Dr. Walter J. Meek, who, I might add, was the best teacher I ever had in my years of study at the University of Wisconsin. I might explain that I have never had the privilege of taking a formal medical course. Perhaps that is why I have been asked to speak on medical education.

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But, seriously, my experience in teaching in allied educational fields has given me a respect for the combination of research and teaching, which may not be universal in the medical field. However, Dr. Meek not only was convinced of the effectiveness of this combination but felt that he was not alone among teachers with this point of view when he spoke briefly about it some years ago. This is what he said:

> Historically, research is probably quite as old an activity as teaching. Hippocrates, whose original works are not even preserved, was a clinical investigator of no mean merit.
>
> Aristotle would rank with present-day research embryologists. Both were teachers and research workers. However, the two activities were almost entirely separated from each other.
>
> When the master was a teacher, he donned his cap and gown, sat on a high stool, and read a book to the students. When he became a research worker he retired, often in secret, to a room in his house fitted up as a laboratory and he was accompanied only by a helper who might or might not be a student. The laboratory did not become a part of the professor's official equipment until the Italian Universities flowered at the end of the 16th century. Even for centuries after that, teaching consisted not in performing experiments or presenting very many demonstrations, but in reading what some authority had written on the subject. It was in this way that the books of Galen for 1,300 years became the scientific bible. Theoretically and practically anyone who could read, could teach.

The lecture, just like the apprenticeship, is still, in somewhat modified form, a backbone of our teaching today. A junior at Marquette University School of Medicine recently reported that he had listened and had taken notes in more than 1,400 lectures during his first two years of formal medical education. I have never measured our own program in this fashion, but I trust that ours, and most others, rely just about as heavily on the lecture method of teaching.

And I do not say this in criticism, for the lecture is a very efficient teaching method, but it is an immeasurably stronger method when coupled with experience. This is true for both teacher and student. Without experience, there is no way a lecturer can exercise scientific comparison or judgment, except on hearsay evidence.

Teaching can best stimulate the mind of the student when the mind of the professor is alive and questioning, as someone has put it, "when he is continually seeking new knowledge that will justify or correct his earlier impressions, when he kindles in the mind of the student by his own fire that lamp of truth which reveals all knowledge as an age-long and immortally unending search."

My first point, then, is that teaching must be a continual process of education for the teacher and that it can be carried out satisfactorily only when he constantly tries to enlarge his knowledge and test his ideas by an experimental method, which is research. I think that most of us can agree on that point.

The Student's Motives in Research

It is the second point in this regard on which we may have some differences of opinion. This is the value of student research in the teaching process. This point might best be put in the question: "How far should we go in encouraging a medical student to do research during his training career, and how can research activities be integrated with other teaching methods?"

Everyone in education does or certainly should recognize that the process of learning depends on how the student feels about what he is learning. If his feeling is negative, the learning will be negligible. If he wants to learn, learning can be much more rapid. Thus, the factor of motivation becomes a very important one.

In the field of medicine, many students are highly motivated often from a very early age, and this motivation is strengthened throughout training. However, I think it is important to keep in mind that every student has his own set of motivations, in medicine as in every other endeavor. Some may see in medicine a highly lucrative career and yearn only for the diploma as a certificate of a gilt-edged credit rating. These are not likely to be really educated by any method, and, for the sake of the profession as well as all humanity, it is best that they be denied admission to medical training. Some, and these include many of our best practitioners today, may be highly motivated by a desire for service, a hope to alleviate suffering and to save human life. A third group might

include those who marvel at the wonder of nature that is man and want, more than anything, to understand more and more about this creature.

There are, undoubtedly, many more primary motivations to consider, but these latter two are enough to confuse us in planning medical education. I would like, however, to offer some evidence of the value of research in the education of both of these groups.

Let us examine first the last of my examples. A member of this group is likely to be the rugged individualist, often a nonconformist, who has an intense curiosity about natural phenomena, an ability to generate abstract ideas, and a strong desire to know. It is from this group we are most apt to develop the research men, the mature teachers, and the specialists in highly advanced fields.

To plunge them, as early as possible, into the challenging world of research in an atmosphere of freedom under the restrained guidance of a leader in their particular field of interest is, perhaps, the best educational experience we can offer. For these are minds and attitudes which need little more encouragement than a problem to confront. They are like horses bred for jumping—you need only head them toward the barrier.

The problems they discover in the laboratory will concentrate their interest on the lectures and demonstrations, especially when these offer basic material that can be applied to their research. They are inclined to be impatient with the old master who reads from the book or "Herr Doctor" who, leading them on rounds, expects his quick guess to be taken as Bible truth. But they will intensively pursue knowledge on the rounds, in the classroom, and in the library, and, while we may be hard pressed to endure their impatience and not a little hurt by their irreverence in the face of age and experience, at some future date we may well be proud to drop their names as "one of my former students" at gatherings such as this. For it undoubtedly will be one of them who will help unravel the mystery of cancer, help us stem the deteriorations of aging, help reverse the trend in mental illness.

Yet, if we cut our finger, we might not choose them first to bind it up; theirs is not an interest in easing our pain but rather an understanding of the meaning of pain itself or of the velocity of the blood flow through the cut or even of the effects of an uncleaned wound.

Again, I do not say this in criticism, for their motives are clear and honorable. Their satisfaction is not in direct service but in ultimate service. They are the sort who can give half their patients a promising drug and the other half placebos, knowing that the second half will suffer in consequence. To prove that the first half will be either helped or harmed is their satisfaction. They are best trained and kept in the laboratory. I have a feeling you might agree.

Research in Training for Direct Service

It is, of course, the group of students motivated in medicine by humanitarian considerations who raise the basic question of the value of student research in teaching. Their satisfaction is direct service. Their rewards, I might interject, are likely to be more direct and in the coin of the realm.

They have the ability to work in and with an organization and the desire to solve specific problems of immediate concern. They are not only the general practitioners but the specialists in some of the more static fields. They often have what we laymen blasphemously call a "bedside manner." Incidentally, they can do a good clean repair job on our cut finger and be genuinely sympathetic about it, too.

Why should they be subjected to the rigors of research? They usually are willing to accept the truths of the book or the old masters. It is not necessary ever to put your hand in a flame to determine that it is hot, if you will just believe your mother. Why should we force these young people to put their hands in the flame?

First of all, while it may be hard on their hands it is good for their minds. Some today say that every educated man should understand the methods of science. "Our progress in science and technology," James R. Killian has pointed out, "will be advanced by our educational success in still another area—the achievement of a high degree of scientific literacy among the rank and file of Americans." And he adds, "A man cannot be really educated in a relevant way for modern living unless he has an adequate understanding of science." It would seem to follow that a man whose ministrations are based on a science should, himself, understand its methods and that understanding of the scientific method can only come from personal experience: research.

A second reason has been suggested by the anthropologist Margaret Mead. She recently discussed the transmission of knowledge and pointed out that it has both vertical and lateral movement. The outpouring of knowledge from a wise old teacher into the minds of young people is vertical transmission, and very efficient it is if the concentration of knowledge is high and the receptacle is open. The lateral transmission of knowledge is learning together, the sharing of the pleasures of discovery between the young and old. This is even more efficient, for it requires activity on the part of the student—activity which is likely to enhance retention.

The Lebanese poet Kahlil Gibran describes great teaching thus: "A teacher does not bid you enter

the house of his wisdom, but rather leads you to the threshold of your own mind." This is the process of joint learning. This is student research.

A third reason for student research in medical teaching is again motivation. Granted, the student group I now am discussing is not motivated primarily by curiosity. Yet its motives can be broadened and, I believe, bettered by research. Let me explain with a personal example:

It concerns my reading of the *Journal of Biological Chemistry*. In my laboratory days it was my habit to take each issue of that journal home, as it arrived, and spend an interesting evening looking through all the papers, reading some but scanning most. However interesting I found the papers on many subjects in this reading, I discovered that I did not thoroughly digest their contents, except when they related to my field and I read them a second time.

I am thus inclined to believe that a student can read religiously his medical textbooks and listen patiently to his medical lectures without fully comprehending what he reads or hears, unless he has had direct experience—research experience—which prompts more thorough study.

This brings me to the fourth and final value I want to cite for exposing this group to research as a part of its medical education. Understanding the methods and challenges of research will help give these people both patience to live with the inadequacies of our present knowledge and trust in the eventual success of our scientific efforts.

Our early impression gained from the surprise success of our atomic research led many to think that if we just assembled enough money and scientists in one place, we could do almost anything. Later, when we learned the tortuous and discouraging path that led to this discovery, we gained more respect for the brilliant minds which conceived the theories and the almost superhuman courage of those who brought the experiment to success.

It is this latter lesson that is important for the physician at the bedside to have learned. He can learn it best if he, himself, has faced research challenges. And with this knowledge he can be of inestimable aid to the man at the research front, for he can direct his problems and his field findings to those who can correlate and apply them, experiment on them, and perhaps improve our knowledge of them.

Let me give you an example of this sort of aid to the scientist, which many of you will recognize. I am particularly familiar with this situation because it involved a colleague in my department, Karl Paul Link.

It may not be necessary for me to explain that the University of Wisconsin is a state, land-grant institution, widely recognized for its efforts to make its unique resources as useful as possible to the people it serves. We have told the people of Wisconsin over and over again that if they have a problem that is beyond them to solve to bring it to the university. To facilitate this referral of problems, particularly in the agricultural area, we have county agents throughout the state who are trained to be alert to situations which would be benefited by scientific investigation.

As a result of all this there was unloaded on our doorstep one day one dead cow and a bucket of blood—and the serious problem of farmers in many areas of the northern plains states, sweet clover poisoning. Dr. Link's work, prompted by this problem, led him to bishydroxycoumarin (Dicumarol) and warfarin, and the rest of the story you know better than I do.

Let me stress the point, however, that it was knowledge of and faith in research that led to the solution of the farmer's problem and to subsequent medical benefits undreamed of at the time. The impetus did not come from the laboratory. Thus, I do not think it is possible to put too high a value on a medical profession trained, through research, to recognize and refer problems that science can attack and solve.

Particular Problems in Training

Now I recognize the fact that I have oversimplified the problem. I have barred from medical school those whose motives are money and treated those whose motivations are humanitarian and those motivated by curiosity as distinct groups. In medicine, particularly, we recognize that there is a considerable gray area between the blacks and whites, and, in reality, this area is rising to new prominence.

I speak now of the particular problems involved in the training of those specialists who must be called on for clinical work yet whose area of specialization is so fast-advancing that it is hardly out of the laboratory stage.

Let me select but one field out of the several in the category and discuss it briefly. Cardiovascular surgery is such a field. In work of this nature, the students often are postgraduate, the instruction highly specialized. It is not uncommon that the research team and the clinical team are of the same personnel composition. Yet it also is not uncommon for an internship to be served in such endeavor without the ultimate goal of concentration in this specific field.

In a recent symposium on experiments in medical education as they relate to cardiovascular teaching, which was part of the Fourth Conference of Cardiovascular Training Grant Program Directors, there was considerable discussion of research or project teaching. It was here concluded that the students' experience is the goal of such teaching. He learns that there is no perfectly designed experiment, and this comes as a shock to him. He

gradually accepts this as being a real and necessary thing. The value is in student experience, this group stressed, not in research results. Its over-all value, this group found, is to provide the student with a critical attitude which will enable him to become a more astute observer in the evaluation of a problem.

Yet this group found it difficult to determine whether a "carry over" results. On completion of internship, it was reported, individual students refer to their project teaching participation as a favorable experience. It was admitted that under the voluntary programs the student participation is usually composed of the better type of student. It was recognized that a large percentage of these students ultimately pursue a career in academic medicine. In assessing the results of the program, it was stressed that one must have an impression of the effect of this teaching method. Dr. Robert F. Pitts of Cornell University put it this way: "It is not an impression that you have altered the attitude of a student. That his attitude has changed is not an impression; it is a reality. It is my impression that this is good."

Economic Needs in Research

Now, if I may, I would like to close on the traditional theme of all college and university presidents—money. Lectures provide economical teaching. Demonstrations, preceptorships, and clinical instruction are not too expensive, unless it is necessary to operate a hospital to provide them. But research is expensive. This is one of the reasons why some minimize it in the teaching program. But I am so convinced of its value that I feel special attention should be given to the problem of its financing.

And there are some special needs which I would like to call to your attention. Not only does research require extra space, equipment, and supplies but it removes the student from service in routine tasks and he must be replaced by a technician. Thus, extra funds are needed for the obvious research costs and, also, perhaps in the form of fellowships, to free the student from routine duties.

I call this to your attention not in preparation for passing the hat among you but rather to make you aware of this special need and to solicit your influence in meeting it. You may recall that some time ago I mentioned the word freedom in connection with the atmosphere which is necessary for productive research. Such freedom can be facilitated by unrestricted fellowship support, support which does not tie the young experimenter to a team program under a dominant director who controls research through a tight hold on the purse strings.

Again, I want to point out that the thoughts I have expressed today have been drawn from experience in a field which has only a back-door acquaintance with medicine. I hope they prompt more soundly based ideas, and I thank you for your patience with an "outsider."

1959
V. 1

RESEARCH ORIENTATION AND METHODS

CONTRIBUTION TO EDUCATIONAL OBJECTIVES OF THE BASIC MEDICAL SCIENCES

William N. Hubbard Jr., M.D., New York

At the outset, it is important to emphasize that the contribution of a research orientation to achieving the educational objectives of the basic medical sciences is no different in principle than the person's ultimate responsibility for his continuing self-education in his profession. Although the basic medical sciences present both specialized problems and particular opportunities that relate to research, they should be considered as specific examples of general problems rather than being set aside in a separate category.

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Read before the 55th Annual Congress on Medical Education and Licensure, Chicago, Feb. 9, 1959.

Teaching Objectives

Over a three-year period, the Teaching Institutes of the Association of American Medical Colleges considered the teaching of the departments of the basic medical sciences. In each of these years efforts were made to specify the objectives which these departments set for themselves. A refreshing lack of unanimity was apparent, but it is possible to categorize two broad objectives which seem common to all of the departments. The first of these is to prepare students for the practice of medicine and the second to recruit from the student body the few students who will be the teach-

ers and investigators in the medical sciences in the future. These broad objectives have undoubtedly been stable for many decades and will continue to be so in the future. However, with the extraordinary changes that are taking place in the practice of medicine and with the tremendous growth of opportunities for teaching and research in the basic medical sciences, those concerned with the educational environment offered by the medical faculty have been reconsidering their traditional approaches to achieving their goals.

As recently as 25 years ago, only a handful of the medical faculties in the United States provided, in the basic medical sciences, an opportunity for more than a passive participation of the student in a series of didactic exercises and laboratory manipulations. The latter were commonly carried out from a detailed recipe book with the quality of the effort being judged largely by its conformity to a predictable outcome. In subsequent years there has been an exponential increase in knowledge pertinent to medicine, arising largely from research initiated in the areas of the basic medical sciences. The volume of important information is now so large that it is a manifest impossibility to present it in a comprehensive didactic fashion in the time allotted. As a result, an increasing degree of selectivity has to be exercised by teachers in choosing the material which they will present. The rapidity with which new information develops has now made it quite obvious that it is at least as important for the student to understand the process by which scientific data are reevaluated and accumulated as to master the momentary common store of knowledge.

Opportunities for the student to experience the pleasures of creative work that are inherent in seeking out scientific understanding can be more readily provided when he works independently in an area of his own interest and responsibility. This is a central educational role of research. For all students of medicine, then, these principles of instruction are the same: they must learn, against a background of common knowledge, to use their own senses in collecting enough pertinent data about a problem so that a rational hypothesis may be constructed and a soundly conceived effort taken toward the solution of that problem. To visualize and to solve problems—no two of which are precisely alike in biological systems—is equally the concern of the family physician and the research scientist. Both must have learned habits of critical inquiry and continuing scholarship that will allow them to remain creative members of a learned profession rather than simply practitioners, albeit skillful ones, of a vocation. They must be critical of their own judgment and decisions, discerning about the validity of what they read, skeptical of final conclusions, and anxiously concerned about the individuality of the problems to be solved. In short, they must learn to be scientific physicians, whether their work is at the bedside or in the laboratory. The setting in which these goals can be accomplished is compounded of students of excellence and faculty of distinction working in an atmosphere of scientific inquiry, critical self-appraisal, and independent scholarship. The intellectual discipline of accurate observation, logical deduction, adequate verification, and final generalization is the common goal.

Student Participation

The active participation of the student and his developing sense of individual responsibility for his own work are requisites of success in achieving the objectives of education in the basic medical sciences. The student must therefore assume responsibility in using the opportunities afforded by the faculty for self-development. Cardinal Newman in his lectures on "The Idea of a University" has emphasized that this kind of cultivation of the intellect is in itself an appropriate goal, just as the tending of the body with a simple view to its general health is acceptable. On the other hand, as general health is fruitful only as it precedes useful labor, so the trained intellect in its chosen field of special competence is fruitful by being able to think and reason, to compare and discriminate, to analyze with refined taste, and to formulate general judgments.

The zest for individual excellence is difficult to acquire under any circumstances but almost impossible where the student is bound to conformity to a too rigid curriculum. The quality of rational, informed skepticism which Santayana has called the "chastity of the intellect" is a natural outgrowth of efforts to pursue rigorously one's own interests in the sciences. Whitehead has suggested that the most austere of all mental qualities—a sense for style—can be recognized by the enthusiasm of attainment coupled with the discipline of restraint. The capacity of a person to love a subject for itself is the manifestation of achievement of style in that area. This almost moral sense of the intellect is the product of specialized study, and it is the exclusive privilege of the expert. The pride of craftsmanship that is developed is a continuing insurance of the maintenance of one's own individual standards of excellence.

Actually, the functions of transmittal of information and training in research techniques that are carried forward in medical schools could be performed at a cheaper rate separately from these expensive institutions. Books are cheap, and the system of apprenticeship is well understood. The justification for a university ideal is, as Whitehead has emphasized, in that it preserves the connection between knowledge and the zest for life. The university not only imparts information but imparts it imaginatively and critically. This quality of im-

agination is a contagious disease, to be disciplined by knowledge and the habit of scholarship to become responsible scientific inquiry. The development of a scientific style is therefore one of the particular contributions that research efforts can make in the education of future medical scientists. If a medical scientist is a scientifically trained physician, then there is no difference in this regard between good medical practitioners and good medical scientists; the more scientific the inquiry of the physician about his patient, the better practitioner he is. There need be no conflict between the art and the science of medicine, since noble behavior is not diluted by scientific knowledge and good practice depends on both of them.

Basic Medical Sciences

One of the most serious problems confronting medical education today is the decreasing number of physicians who are entering careers in the basic medical sciences. In spite of the rapid advances in certain areas of medical science in recent decades, the fact remains that medicine stands today only at the threshold of its development as one of the biological sciences. Unsolved problems of crucial importance concerning man and his diseases are still to be approached in all fields of medicine. Because of this, there is an increasingly urgent need for talented persons to take up careers of investigation and teaching in medicine. At the present time, the need is not being met. On the contrary, the number of medical school graduates in training for such careers seriously threatens, through shortage, the continuing progress of medicine. The spirit of adventure that is inherent in a search for understanding must be made available to the student if he is to sense the satisfactions of an academic career. Through participation in research activities he can personalize the growth of knowledge rather than look on it as some extraneous phenomenon. By participating in research he learns at first hand the importance of biological variation. He acquires an ability to deal rationally with variables in terms of mathematical probability. Simultaneously, he learns of the ever-present opportunities for improved understanding.

It seems quite clear that if a student learns from the basic medical sciences only the facts and skills that are preselected for him by the organization of the curriculum there is little motivation for him to consider a career in the basic medical sciences or, for that matter, to acquire the scientific style which could later distinguish him as a clinician. It has therefore become useful to provide a degree of flexibility in the medical curriculum and to give an opportunity for independent study and research training in areas of the students' own interests, in addition to maintaining the highest standards that insure a student to be fit for these independent intellectual enterprises. As Dr. Vernon Lippard has written of the program at Yale University, it is fundamental in the concept that the student is a mature individual, that he is strongly motivated to learn, and that he requires guidance and stimulation rather than compulsion or competition for a relative class standing. Equally basic is the concept that if a student is given unusual privileges he must assume more than usual responsibility for his education. Although these views were expressed in reference to the medical student, they could apply with equal emphasis to the mature clinician and the investigator.

Specific Research Program

In the past decade many medical faculties have increased their emphasis on research, following the lead of those in which the emphasis on research is traditional. The presence of active research efforts by the faculty has provided the opportunity for experience in research increasingly enjoyed by medical students. Rather than attempt a summary of programs in student research, let me describe the outline in a single school, emphasizing that it is cited as an example of convenience rather than implying that the opportunities are unique.

I refer to the New York University College of Medicine. For a few selected college students interested in research, summer laboratory experience at the medical school is provided. Generally, these are talented students who have not fully decided on their careers and who may be attracted to medicine by becoming more familiar with its foundations. Similarly, the summer is a time when large numbers of students in the four years of medical school undertake independent work. The student is required to prepare a short research protocol and have it endorsed by his potential sponsor, who is a senior investigator. The applications are reviewed by a faculty group and modest stipends awarded on the basis of merit. For those few students who have undertaken significant problems in research and who are seriously interested in an academic career, a fellowship year in full-time research is provided. The merit of the candidates determines the number offered, but it is small.

Throughout the first two years the students may elect to participate in an honors program. This consists of a series of weekly lectures and related seminars given on Saturday mornings. The speakers are persons distinguished for their research activities in biology and biochemistry related to medicine. There are also journal clubs for students, with an elected faculty preceptor, that meet twice a month in the evening. Faculty research advisors are also available to help the student initiate his own independent work. Since this program is voluntary and extracurricular and since its work demands are rigorous, the self-selection by students is striking.

In the first year—at the completion of the regular anatomy course—a special series of lecture and laboratory periods are devoted to current research approaches in anatomy. Electron microscopy, cytochemistry, tissue culture, and histochemistry are included. Similarly, in biochemistry a special series is given after a condensed basic course has been presented. This group of lectures and laboratory exercises introduces in some detail problems of portein characterization, enzyme chemistry and nucleoprotein metabolism. In pathology there are about a dozen two-hour periods where students in very small groups have demonstration-seminars in the laboratories of the individual investigators in the department. Here they see and handle the actual "bench work" as well as being able to discuss the problems with the investigator.

In the fourth year, there is a four-month block of elective time, which, with preceding vacation periods, can be extended to seven or eight months, when the student may pursue uninterrupted research without omitting any of the regular curriculum. By use of all vacation and elective time, 11 calendar months of research may be included in the four calendar years of the curriculum. This allows for that most important phase of encouragement of youthful imagination without demanding a premature commitment to a career in either practice or academic medicine. The particular role of research in the basic medical sciences is, then, an essential part of the development of the medical scientist, whether he be scientific practitioner or scientific investigator.

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CONTRIBUTION OF RESEARCH ORIENTATION AND METHODS TO EDUCATIONAL OBJECTIVES OF CLINICAL SCIENCES

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Most students enter medical school with an idealism often not expressed but directed toward human service. With this is also frequently coupled a deep-seated curiosity as to the nature of biological phenomena and an intent, in some vague way, to elucidate them further. The humane idealism needs to be fostered certainly, and this is not difficult. A critical curiosity, however, is not at all easy to direct; nevertheless, unless we can direct the ordinary student into the development of a critical frame of mind, this curiosity will atrophy and the progress of medicine will be slow indeed.

I thus find this topic that I have been invited to discuss an intriguing one—this relationship between experimental methods and the development of the physician—for it introduces a possible way of encouraging this curiosity. It would hardly have been feasible, even a few years ago, to consider giving time to the problem of research and the experimental laboratory in the clinical years of undergraduate education. Just a short while back the experimental laboratory was not for the student who was a sound clinician but rather for the student who often showed a lack of the practical yet was able to make excellent grades in his subjects. To serve as a laboratory assistant to an able investigator in the preclinical sciences was often sought for, it is true, but equally as often the stipend rather than the intellectual opportunity was a very strong motive.

For the student who was to be a good clinician, the experimental laboratory was considered by some actually to be a detriment, since it tended to warp clinical judgment. In such an environment one saw the problem as it concerned an experimental animal or as it existed in the chemical laboratory, not as it manifested itself at the bedside.

We find ourselves now concerned with the wisdom of acquainting the undergraduate student with the experimental laboratory and in this consideration with the undergraduate during his third and fourth years of medical school education—just those periods in which most schools provide their teaching in clinical medicine. We who for some time now have made a fetish of bedside teaching are actually suggesting that this be diluted with a participation by the student in experimental medicine, or at least an understanding of the methodology of experimental medicine, for a dilution will be necessary. We cannot just add such an experience to the curriculum, for there is no longer any extra time in the curriculum. We naturally view such radical change with suspicion.

Bedside Teaching

We have lived with the philosophy of bedside teaching for so long now that its very concept has become sacrosanct. It is true that years back, when

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this form of pedagogy was establishing itself, it had its own troubles in superseding the lecture. Many times the concept of bedside teaching was taken perhaps too literally, and groups of 20 or 30 students were distributed around a patient's bed while the teacher percussed the dimensions of the heart of his patient or tried to demonstrate a soft presystolic murmur to an unappreciative audience. "Old Shifting Dulness" he was called, and he taught clinical medicine in many a hospital ward, a sort of Mr. Chips, completely unequipped to stand the onslaught that was to come from the clinical laboratory and its effect on patient care.

At other times, though, this Mr. Chips was an able clinician and an inspired teacher, who would listen to the clinical history given by the student, make a brief and accurate examination of the patient, and then present a clear and logical analysis of the events that were transpiring within the patient. Observation was often so accurate and so complete that the deductive method needed hardly to be brought into play. At other times, objective manifestations were scant and here deduction played a more important role. Occasionally the student saw a rebellious mind at play—one unwilling to accept a relationship between phenomena as causative, when that acceptance often had become honored by time and usage. With the good teacher always the student found a thinking, logical mind capable of inquiry and also capable of directing that inquiry even though the methods used might be as simple as those of William Harvey. Most students tend to direct their interests and their methods of approach toward the solution of a problem in the same direction as does the teacher who affords them stimulation. This good teacher, then, in proportion to his abilities and to the time he found available for his teaching, performed well, because many of his students performed well. Many of us are thinking just now of men who fell into that category. Many of his students, however, not having the faculty of astute observation, relied more on deductions and assumptions, and the practice of medicine too often concerned itself with the recognition of clinical syndromes and an empirical therapy.

There were times when even this good teacher was unable to adjust to rapidly changing social and economic trends that were affecting his patient, the relation of the illness to the patient's family and to his community, and, again, the rapid progress made by the clinical laboratory. Change was necessary, and the change that has come, most of us will admit, has been an improvement. Perhaps, however, with a sense of nostalgia, we miss something that these men had to offer, for what they lacked in milliequivalents they compensated for in an ability to observe and to think. They were individuals and, as individuals, would not have been tolerant of group thinking and group research.

Decline in Clinical Observation

Why has the introduction of the widespread use of the clinical laboratory, with its more accurate tools, tended to reduce the form and effect of such brilliant clinical teachers in our faculties? Fundamentally, I think, the major effect has been on clinical observation. Clinical medicine could not become a science until its phenomena could be measured, could be quantitated. As an example may be cited the ability to determine the amount of sugar in the blood with the advent of the discovery of insulin and its use in the treatment of diabetes or the determination of the state of renal function by the measurement of the amount of certain substances in the blood plasma. There are many others, of course. Crude observations were not enough. To note that a patient presented pallor was inadequate in the understanding and treatment of anemia. Inspection, palpation, and auscultation were not thrown into discard, but the acuity of their use has been less evident since the introduction of laboratory methods. We may regret this, but at the same time I think we must recognize that it had to occur. Instruments more accurate than the eye and more subtle than the touch have necessarily taken the place of cruder methods of observation. Clinical observation then being less important became less accurate. The physical examination deteriorated until one now so often sees it on the hospital record existing as a jumble of unintelligible abbreviations.

As different tests began to be developed, the diagnostic tools were literally removed from the hands of the diagnostician and placed in the hands of technical assistants. The laboratory has not been free from pedagogic fault. Too often it seems the student now studies the diagnostic problems that his patient presents through the medium of a signed requisition. The radiologist on request will measure the size of the heart for him, and the cardiologist will present him not only with a picture of the rhythm but with one that will show the electric conductivity as it exists in various portions of the heart. He will even take a picture of the murmurs if any exist or measure the diameter of the mitral aperture if there is a degree of stenosis. The radiologist will diagnose for the student the nature and the extent of pulmonary disease with an accuracy often beyond that which the student or his teacher can obtain with the stethoscope, and this once ubiquitous tool of the internist now finds itself chiefly in the pocket of the surgeon, who notes its chief value in listening to the musical gurgles of gas as it fights its way downward through the recently traumatized intestinal tract. Even though a surgeon, I cannot but at times express regret at the lowly estate to which this once treasured instrument has fallen.

In the laboratory analysis of substances present in the blood, either naturally or from the use of certain functional tests, a new vernacular is de-

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veloping. One now hears the expression "the patient's chemistries" were normal or a "spectrum" of liver function tests was performed, or the patient is now "in balance." It is not unusual to have many of these analyses made as a "routine" procedure. As such they require no discriminating thought. One merely needs to collect and appraise the results. I grant a modicum of exaggeration.

Such use of the laboratory has led to greater demands for diagnostic procedures to be performed, and this in turn has led to greater use of the specially trained technician. Too few students today know the vagaries of the techniques that are used in performing the tests that they demand, and no one now expects them to. More and more we move into a period in which the accuracy of diagnosis of a patient's disease rests in the hands of others than his physician.

Before I am accused of being too partial in directing attention toward the diagnostic methods learned in general medicine that tend to permit others to usurp diagnostic authority, let me add quickly that the surgeon is in no way different. An example is seen in his approach toward a patient with a lump in her breast. In most of the instances this patient finds the lump first. When she consults her surgeon, he does not even have to suspect cancer; she has done it for him. He places her in a hospital and removes the lesion in order to establish a diagnosis. It is true that a description of the physical characteristics is recorded on the clinical record, but the mass is destined for removal regardless of the diagnosis. Once the mass is excised, the surgeon may examine it if he wishes but the diagnosis is not official until a pathologist performs a frozen section and tells him the diagnosis. It makes no difference that most surgeons can recognize a cancer of the breast when they cut it out and look at it. The hospital must provide that pathologist's service, and a tissue committee sees that the surgeon uses it. As a result, morbid anatomy ceases to have as rigorous a position in the clinical years as it formerly did.

These tests have piled one on another until it is difficult at times to evaluate their meaning. There is no need to cite other instances. They are familiar to us all. We are equally familiar with the fact that the utilization of these procedures and the expert personnel required in their elaboration has also given us a diagnostic accuracy and a therapeutic achievement that has been thrilling to see unfold. We may wish to use these procedures more wisely and with more thought. We may object to the inspection by outside agencies who wish to make sure that we are using them. However, none of us would care to practice medicine very long without them.

Nevertheless, the ability to take an accurate history, to observe the physical appearance of the patient with utmost detail, and then to analyze the significance of this information is losing its acuity. In its place we are developing a mechanization of the art of diagnosis and a therapy by formula. We see an apparent lessening of the need for critical reasoning because of the utilization of an instrumentation often too complex for the student to master or, at times, even understand. We are thus confronted with the paradox of retaining and even continuing to expand the fine accomplishments of laboratory medicine and yet at the same time fostering in our student an attitude of observation, doubt, and inquiry that he formerly received from bedside observation and teaching. But this paradox can be solved, for many have done it.

Pedagogic Value of the Experimental Laboratory

Undoubtedly the best clinical teaching that we encounter or our wards today is coming from those men who have been able to relate the laboratory to the patient. It is because of this very fact, I think, that our subject today is important, for these men have one thing in common. Not only have they studied the sick individual with all of his numerous problems but they have been more than casual participants in understanding the analytical methods of the laboratory. They have asked questions and sought the answers by experimentation. To do this, the tools and tests of the laboratory have been only a means, not the ultimate goal. Why then would not this educational pattern of the good teacher be a good experience for the student? Would this not be a good way of solving the pedagogic dilemma in which we have found ourselves during the clinical years of undergraduate education? Perhaps yes, if it could be done well. This would make it possible to encourage the student to ask a question and then aid him in developing a methodology by which the question might be answered. Certainly the ability to ask and then to answer such a question will be an index of the maturity of the student's education. But will a period in the experimental laboratory really do this, and, if so, how can it be brought about?

Under consideration here is not the value of good clinical research but rather its value in helping to develop an inquiring mind in the average medical student. I doubt if such experience will develop much originality. It is conceivable that the student may bring to such a study original and well-thought-out ideas or that similar ideas may develop as he elaborates on a problem supplied him by someone else. Such will, as a general rule, be beyond the ability of the average junior or senior medical student. We shall not be considering, therefore, the idea of inserting into our clinical curriculum a brief period devoted to discovery, for the chances are that while originality would be cherished it could not be taught.

The value that such a discipline would have to offer then must relate to its methodology. This methodology is complex and, in accent, will vary

from time to time. It is fundamentally concerned with imagination, reasoning, observation, and understanding, and these certainly are qualities we would like to develop in our students. It would be well, then, if our student entered this study with an academic background that allowed the free use of epistomological rules. So few of our students do, however. Most of them have spent far too much of their time before entering medical school in accumulating scientific facts or have taken their majors far afield—in music or in history. Desirable as this knowledge of formal logic may be, the lack of it should not pose an insuperable hurdle. Often the student who has had a preparatory background in the liberal arts will have adequate experience in the use of formal reasoning to understand the nature of the goal and the principles involved. This being true, the research problem will best be set up with student participation and not prepared in detail for him. Here the student will come face to face with the nature of research and the ability and character of his teacher.

By clinical research I am not concerned here with retrospective studies in the record room, such as the counting of the number of people who have survived for a period of five years or more after a particular therapy. I am also not thinking of the "case report with a review of the literature." Enough data of this sort have accumulated to satisfy even the dust of Francis Bacon. I am thinking of research as it applies to answering a question by a well-devised experiment. Such research has been described in many ways. I like a recent definition of Bernard Greenberg's, "a burning yearning for learning." If the first letter of the last word is omitted, one sees clearly the common motive for violation of the essence of research. Too often, research studies become the legal tender of academic life. There are deans and even faculty committees who use the number of papers published as an index for academic promotion. We teachers are critical of this; we even become cynical about it but, when asked to serve on a similar committee, find ourselves seriously considering the same unit of measurement. The annual departmental report is often mute testimony of that department's scientific interest and motives. The late Professor Robert Bensley made a point of insisting that it was of little importance who first did a piece of work or who was first to report it. The important thing was always "is it true." A student introduced into an atmosphere where something less prevails will be injured by the experience. Besides a good intellectual background then, he needs a teacher and a guide, for here he must see nothing but the best in scientific morality.

It is difficult to imagine a more valuable experience in self-criticism than that of designing an experiment under wise guidance that would give valid results regardless of their nature. In setting up an experiment, in determining the number of observations and the nature of the control, biostatistical methods are a necessity. Experimental design must follow fairly rigid rules, or else observations become untrustworthy or irrelevant. Often the recipient of jokes by the "practical" investigator, the biostatistician has been a patient soul. For a long time he was ignored by the clinical investigator, but, as evidence began to accumulate as to the use of formal statistical methods in the evaluation of data, a change in attitude began to take place. Many schools now even have a course given in biostatistics. This consists, as a rule, of only a few hours of instruction, it is true, and generally it is given in the preclinical years in order not to take time away from sound clinical experience. Perhaps eventually it will be taught in the clinical years and papers that have been published in some of our clinical journals given students for statistical analysis as exercises in critical judgment. If this were done, it undoubtedly would have a beneficent effect on certain editorial policies. It would have an equally good effect on medical education during the clinical years. There is probably no better critical experience than that of studying published clinical reports from this vantage point.

Having planned the experiment with the type of observations to be made, the student must now make these observations. It will be recalled that Claude Bernard felt that the observer must be unprejudiced and passive. Only when he becomes the experimenter is he allowed to be the active questioner of nature. Prejudicial observations have meant a fatal ending to many careers. Fortunately, we have reached a position today when it is a very simple thing to obtain such "passive" observations. Such is the value of electronic devices. Observations can be made speedily, accurately, and repetitively—provided that the proper instrument is used, that it is well calibrated, and that its mechanism is understood. It is of little value to measure "that which one knoweth not." It is essential, therefore, that the investigator be familiar with the instruments used in making his observations. He cannot safely rely on a technician to supply him with his data unless he can supervise the work of the technician. For the student to be placed on an experimental problem, so designed that the observations are complex and must be made by an expert employed with funds obtained from a project grant, may result in the answer to a question, but it will not be a good exercise in critical judgment. The type of experiment on which the student works must therefore have definite limitations. So many students, not being seasoned investigators, have what amounts to a saintly disregard for such detail in experimentation. They demand that they be allowed the privilege of great discovery. It is up to us to acquaint them in the beginning with the cost.

Besides being familiar with the design of his experiment and the instruments and techniques with which his observations are to be made, the

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student must also have a thorough knowledge of the background of his problem, of the work that others have done relating to it, and of the accuracy of their conclusions. He must have read, and read in such a way that he has explored, many collateral fields. He must know how to catalogue his reading, discarding the irrelevant and preserving the important. He must know how to record his observations so completely that no experiment need be repeated and that when his data are assembled a valid conclusion can be made. This will take time. It is not a job for odd moments.

These are rigorous rules that I have outlined, and intentionally so. A slovenly performance by the student in the experimental laboratory would defeat the very purpose for which the experience is being designed. For a student to work in a laboratory during the summer months with a stipend that is generous, on a problem that is vague and without adequate supervision, is not enough. The student must be taught in the experimental laboratory with a care equal to that with which he is taught on the wards. Just now there is a real shortage in clinical teachers who are familiar enough with the experimental laboratory to do the work well. Too many of our clinical teachers are products of a graduate curriculum specified for them by their specialty boards. Such an experience in research is no concern of a specialty board. Most schools have a few such men, however, and just now there seems to be a preponderance of these in departments of internal medicine. If the experiment is a limited one, a beginning can be made. Obviously, students would have to be selected carefully. Perhaps this is well, for at present few schools have entire classes in their clinical years that would be receptive to such an experience as being preferable to that spent in some clinical endeavor. Nothing could be more detrimental than to have a coercive approach.

A number of our schools are already proceeding with this curricular experience in spite of these obvious difficulties. Enthusiastic students with good minds are already coming under the tutelage of able clinical investigators during their summer months and during elective periods. The result seems to be well worthwhile. It is highly likely that the practice will gather momentum and that it in itself will make facilities more readily available. Needed will be able students and good teachers with available time, space, and equipment. Just now no school has enough of these, and therefore an evolutionary approach is mandatory. It promises to be a notable addition to the curriculum of our clinical years, but it cannot be brought about by simply assigning a block of time for research during this clinical period, as some have thought possible.

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THE ROLE OF RESEARCH IN GRADUATE MEDICAL EDUCATION

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The increasing significance of the role of research in the education of all physicians is readily apparent, and the value of research in teaching the scientific method and extending its war against empiricism needs little further apology. Its usefulness in stimulating curiosity and evaluating data is true at any time in a physician's career—whether it be as student, graduate, or practitioner. What, then, are the questions to be raised concerning the proper place of research which are peculiar to graduate medical education? How is graduate medical education different from undergraduate medical instruction? Perhaps a set of answers to this latter question might help in part to answer the former.

Establishment of Research Orientation

"Undergraduate experience," according to Darley, "is aimed at developing the fundamental principles applicable to the whole body of medical knowledge, at establishing habits of reasoned and critical judgement of evidence and experience, and at developing the ability to use these principles and judgments wisely in solving problems of health and disease."[1] The graduate years are reserved for undertaking "to become as proficient as possible in the complete, detailed, systematic body of knowledge and in the techniques and the judgements required to excel in the one discipline of his [the student's] choice."

In the graduate years, then, it becomes evident that an intense effort to develop more and more independent patient responsibility is one of the primary components of the graduate experience and that an increase in the skills of applying knowledge becomes essential. The young graduate physician becomes more and more a "doer" as he continues his scholarly attitudes.

If it is felt by undergraduate instructors that the experimental method is one of the prime effectors of "establishing habits of reasoned and critical

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judgment of evidence," then it might well follow, as Dr. Vernon Lippard has described, that research would be an assignment and a requirement for receiving the M.D. degree without regard to whether the student was interested in or capable of creative effort. Since the undergraduate medical years are particularly formative ones, this concept may be valid. At any rate, those people who concern themselves with the programs of graduate medical education seem to me to have the right to expect that the undergraduate medical students come to them prepared for their graduate experience inculcated with the spirit of the scientific method and eager to apply it in increasingly independent action in planning and carrying out both diagnostic and therapeutic goals.

If this be true, then at the graduate level research should not be forced but merely fostered. This is an attitude which I would like to believe is not only conducive to good education but also helpful in producing better research. We must give graduate students in medicine, that is, house officers in their internships and residencies (since this obviously does not obtain with respect to research fellowships or the like), a chance to make a mistake of choice in this area as well as decision in the area of their clinical graduate training. They need and should have consultations, but they need to become more and more independent in medical development.

I think I agree with the statement of Lewis [2]: "There is no doubt of the value of research in the nurture of the critical mind; however, I think we are unrealistic if we fail to recognize that only a few have real aptitude and interest in investigation." Does it really seem profitable or logical for a young man who does not have that interest and aptitude to spend a year during which he functions intellectually not far above the level of a technician?

On the other hand, I do sincerely believe that research must be encouraged and that graduate medical educational programs must be geared to stimulate the participants either to continue or to initiate investigative programs of some nature relevant to their own discovery of a problem which warrants solving by first-hand contact with it during the course of their training. Also, research time must be planned for in the residency programs if a person elects to spend a significant period in this fashion. The replacement of the classic pyramidal pattern to the chief residency by the block type of structure has done a great deal to encourage the exploration of a given medical area through the use of a research discipline. It should be stated for completeness that not all students who may elect to try investigation as a method of continuing their education will achieve research results worth much to anyone other than the person who did the work, who, after all, is a most important person.

Research Methods

What are some of the opportunities whereby research methods may play a significant role in graduate education? First of all, the literal use of the word "research" may be exactly what some house officer needs to give him a new chart by which to sail. By this, of course, I mean emphasizing and reemphasizing the one fundamental investigative tool which is all too frequently underestimated, and that is a search of the literature. This is a firm building block of any investigation and it is also an equally important contributor in any continuing education, for it requires a well-developed and perhaps well-disciplined curiosity to be successful in either.

Two things are involved in searching the literature. First, it makes certain that the potential investigator is not merely satisfied to keep busy by working with his hands. Parkinson's [3] law holds for the laboratory as well as for the administrative office. The law in part states that work expands so as to fill the time available for its completion. Second, the investigator may find that his experiment has already been performed. This is doubly comforting on second if not on first thought. If the observations have previously been made, it has saved time and effort (unless he wants to confirm them) of performing the study and it requires critical evaluation of techniques, interpretation, and conclusions before accepting it. It also indicates that someone else thought enough of his idea to invest talent and energy in it, which may stimulate him further. However, it may take considerable introspection before this state is reached.

While the prosaic technique of reviewing the literature is being emphasized, I should like to point out that, obligingly, Castle [4] recently has mentioned the "case report" in a favorable light. He writes, "As with the modern clinical investigator, a hazard run by the busy physician is that he will forget the basic orientation value of his senses. Complex apparatus is not without its disadvantages to the mental activity of the clinical investigator; and without a clear history, a careful physical examination, and simple laboratory studies, the physician may also become lost in a wood in which he sees only the trees. Worse, he may lose the curiosity that urges him onward to a better understanding of disease and of his patients. This is the danger when the dizzy round of the immediate and the urgent becomes too pressing. Then is the occasion for time out for a refresher course or for the preparation of a case report with the help of the medical library where there is sanctuary and sustenance for the hard pressed mind."

This preservation of the curiosity by contemplation and study is an ancient process highly revered. "Curiosity," Castle says, "is an autocatalytic process. More facts come to the attention of the curious observer, and so more and often unexpected data accumulate to be contemplated in search of sig-

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nificant relations. Now, the most difficult problem in medical education is not how to become but how to remain educated in a rapidly changing scientific world. I can think of nothing more likely than intellectual curiosity to provide the necessary growth and development of the individual's knowledge and effectiveness."

A second approach to encourage the possibly non-research-oriented house officer to consider the role of research in his graduate education has been his exposure to research laboratory techniques which have been adopted as perhaps a relatively recent addition to the armamentariums of standard good practice. A rotation of a few months through a modern clinical cardiorespiratory laboratory may be sufficient to whet the appetite both for improved clinical acumen and for scholarship. The results of such contact are immediately apparent on the wards, and the increased number of cardiac research fellows attracted by this technique has been demonstrated amply throughout the United States. The primary proposition is not, however, how to get more research done, but how it may apply to the learning process at the graduate level.

In the same category is the so-called basic science laboratory assignment, usually in pathology, although more recently in biochemistry. This has long been tried as a stimulus for scholarship and, in turn, for an added dividend at the training level. Degree programs which have been developed with this used for a backdrop have been in successful operation for a number of years. Pruitt [5] reported on this to this Congress in 1956. One point which he emphasized quite properly was the production of a scholarly thesis as an indication of effective work, but he pointed out that, whereas the assignment to the laboratory was arbitrary, the exploration of the unknown was an optional derivative of the experience.

I would be remiss if I did not mention that, in any of the guises of introducing graduate students to the laboratory areas, it is apparent that they are being thrown into contact with men who usually have some inclination in the direction of research and without whose enthusiasm, instruction, and counsel the time spent in the laboratory would be similar to that spent as a house officer on a ward without a visiting physician.

If any of the various strategems have been successful in stimulating house officers to scholarship, it would seem valid to insist that an appropriate amount of free time be allowed during a residency for carrying out any soundly conceived research program. In this concept it is convenient to have men and facilities in one's own unit to support the research resident through a significant period. If this is not possible it still seems a wise expenditure of time and funds to attempt to find an opportunity elsewhere for such a person. At this point the secondary gains of such a venture to the staff and house officers would seem to justify this approach.

House Officer Education

There is one other possibility to consider: that in which a student has gone through the undergraduate medical curriculum, has definitely decided on a career in the fundamental sciences, and now is curious about what the role of house officer education is in basic research. I believe this type of experience is often as valuable to the productive career of a basic scientist as research experience is to a clinician. For one thing, I would encourage such a house officer to become actively engaged in some pure clinical research in which human beings must be studied with care, competence, and compassion —a study in which the patient's signing out two days early would "ruin" either the test or the control period. I would hope through this means not only to bring him into contact with new information and discovery but also to demonstrate that there is bad laboratory research as well as good and that there is good clinical research as well as bad. I would hope that he might learn that experiment in both clinical and laboratory research is perilous. One other thing which I would expect that he might learn in this period of graduate medical education is that "while planned experiments," as John P. Peters once suggested, "afford the advantages of voluntary control, the genius of man cannot yet compete with the capricious ingenuity of nature, which has performed upon patients experiments as yet beyond the technique of the physiologist. The science-for-science's-sake and the you-never-can-tell-where-it-will-lead philosophy can be overworked. If clinical investigators need to live down their somewhat shady past (as once was pointed out) laboratory investigators may need to live down their more pretentious present. The number of free-wheeling clinical investigators is probably not greater than the number of test-tube investigators 'becalmed in the doldrums of techniques and mechanisms.' The individuals of genius are perhaps as rare in one group as in the other."

The impact of investigators on house staff education and the participation in research may be profitable and exciting at any time in graduate medical training, and the close contact with patients and their problems can sober the most enthusiastic scientist with the thought of how much more there is for everyone to know and do.

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RESEARCH AND THE TEACHER OF MEDICINE

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There can be no doubt that an effective teacher of medicine must be deeply interested in medical research. The faculties of the medical schools have understood this for many centuries. Every time one or more clinical chairs became vacant, the schools searched for new incumbents among physicians or surgeons who were (1) outstanding teachers, (2) experts in the clinical field they were going to teach, and (3) well-trained experimenters who had made contributions to the scientific aspects of their own fields of medicine. In different schools different degrees of emphasis have been placed on these three requirements, and in certain medical schools the trustees and overseers may have been too interested in whether the professor or the associate professors taught sufficiently and efficiently. In modern times it seems as if this emphasis has changed. In many areas interest in discoveries in medical research has taken the place of interest in efficient teaching.

The teacher of medicine must be well versed in research methods and in the scientific approach to clinical problems because the medical student of today will probably still practice medicine in the year 2000 A. D. This means that our medical schools must provide education which will cover not only the year of graduation but also the four following decades.

Through the ages the progress of medicine has always been rapid, and it can safely be predicted that the knowledge of today will be old-fashioned and even obsolete in 40 years. Many of our contemporaries feel that this historically well-tested experience is not valid anymore. They contend that in our times the progress of medicine has been so much faster and so much more fundamental than in any other comparable period that our knowledge of today is here to stay. However, for many centuries the medical scientists have cherished this erroneous concept.

Every generation of physicians has assumed that at last the stone of the philosophers, the arcanum, the panacea, has been discovered. Boerhaave, Benjamin Rush, Charcot, Osler, and many others extolled the world-shaking and revolutionary innovations which during their lifetimes had—in their eyes—fundamentally changed the aspect of medical science. William Osler wrote in 1902: "Never has the outlook for the profession been brighter. Everywhere, the physician is better trained and better equipped than he was 25 years ago. Disease is understood more thoroughly, studied more carefully and treated more skillfully. . . . Diseases familiar to our fathers and our grandfathers have disappeared, the death rate from others is falling to the vanishing point and the public health measures have lessened the sorrows and brightened the lives of millions."

The most enthusiastic medical neophyte could not sing the praise of 1959 in words more exalted than those Osler used in 1902. To Osler the progress of medicine in 1902 appeared just as revolutionary as the new developments in medicine appear to us today. It seems hardly possible that medicine is shaken only occasionally by revolutions, and there is no doubt that our knowledge of today will appear in the year 2000 as the medicine of Osler's time appears to us today.

The graduates of 1959 will only be well prepared for the medicine of the year 2000 if during their training in the medical school basic medical concepts are kept in the foreground. Since in our American medical colleges experimental medicine and the explanation of the pathogenesis of medical symptoms and signs are emphasized, we can be satisfied that our students are well qualified to understand new aspects of medicine which are bound to be developed in the future.

At the same time, medical education must also provide thorough training in the medicine of today. The fact that the problem of research and the teacher of medicine has been chosen as a topic for today seems to indicate that qualms are being felt about the effectiveness of certain aspects of our teaching. In other words, we have gathered here today to find fault with ourselves in order to strengthen our education by correcting our weaknesses.

Vulnerable Spots in the Educational System

Actually, the opinion has been voiced that two potentially vulnerable spots may have developed in our medical educational system. The ensuing damage, I hastily add, is, as the final analysis will reveal, well compensated, and the ultimate outcome will remain highly satisfactory if a few reorganizations can be decided on.

First, the dangers of overemphasis on research in medical education should not be underestimated, even if untold advantages accrue to the teacher in medicine who is also interested in and occupied with research. Clinical medicine can be defined as the application of medical knowledge to the diagnostic, therapeutic, prognostic, and sociological

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problems of one special patient or of a group of patients. In the estimation of most of the experienced diagnosticians I consulted, more than 75% of the knowledge which a good clinician must at all times have at the tips of his fingers is purely empirical. A few examples may suffice: the leukopenia in typhoid, the thrombopenia in relapsing fever, the dorsal flexion of the big toe in the presence or damage to the pyramidal tract, Kussmaul's breathing in diabetic ketosis, the localization of the tuberculous meningitis at the base and of the meningitis caused by Neisseria meningitidis and that caused by Diplococcus pneumoniae at the convexity of the brain, the peracute start and the acute crisis in lobar pneumonia, the prevalence of influenza bacilli in bronchiectasis, the tendency of bronchial tumors to metastasize to the brain, the predisposition of the adrenals as the site of metastasis of certain malignant tumors, the development of clubbing of fingers in ulcerative colitis, subacute endocarditis, and other diseases, the early destruction of the intervertebral disks in inflammatory diseases of the spine in contrast to the conservation of the disk in metastatic vertebral destruction, and the preference of gout to attack the metatarsophalangeal joint of the foot. These are merely an infinitesimal fraction of the innumerable number of facts of great clinical importance which have to be learned by rote because until now all efforts to find a satisfactory explanation have failed.

Although the progress of medicine will mainly depend on research and experimentation, the fact remains that 75% of the knowledge of the clinicians can only be acquired by humble empirical observations at the bedside under the guidance of experienced clinicians. This part of medical education may suffer in certain schools where the departments of medicine are directed by full-time scientists who largely believe in "reduction in the degree of empiricism" and consequently have only scant interest in empirical medical knowledge without which the clinician cannot do his work.

Second, the short curriculum in American medical schools is also a reason for concern. In 1917, the curriculum lasted for four years, although in most European countries medical education was extended to a period of six to eight years. Now, more than 40 years later, in spite of the tremendous expansion of medical knowledge, our curriculum is still limited to four years. It seems to be generally accepted that even today this four-year curriculum is just as sufficient as it was in 1917 because our future medical students receive careful premedical training during the three to four years of their college education. This argument is not valid.

Today there is general agreement that, with a few exceptions, the training in the high schools of the United States is insufficient for future university students. For all practical purposes the three to four years in college only enable the medical students to obtain the knowledge which they should have obtained in a high school of good standing. In other words, the college training must fill the vacuum which is produced by the unsatisfactory high schools. Recently, under the shocking impact of international political developments, statements and reports have been made public that condemn the condition of our high schools.

Let us not fool ourselves by thinking wishfully that the excellent reports of the numerous committees which study this situation will improve our high schools. The Flexner report had its impact on the sorry condition of our medical schools only because the Rockefeller Foundation and comparable foundations were willing to implement Flexner's proposals with staggering donations to private medical schools. The ensuing tremendous improvement of the majority of the private medical colleges then obliged the state medical schools to follow.

Since the number of private high schools is insignificant and public high schools cannot be changed by donations from private foundations, there is little hope that in the near future our high schools will change for the better. For a long time the vacuum represented by the high school will remain a heavy drag on medical education and will, mainly for economic reasons, prevent any extension of the medical school curriculum. Therefore, the three to four years of college training will have to stay with us, and modifications of the teaching programs in the college years will not be able fundamentally to reduce the damaging influence of the high school period.

Careful analysis of these two potentially vulnerable spots seems to indicate that the brevity of the curriculum and the overemphasis on the experimental medical science are closely connected. Moreover, thanks to a remarkable equilibration, the combined influence of these two apparent disadvantages has actually been favorable.

Medical School Curriculum

The training in medicine, surgery, obstetrics, and other fields that the American student receives during the two last years of his medical school curriculum is mainly in the hands of young instructors and assistant professors whose medicine is of very recent vintage. Participation in the active teaching of the third-year and fourth-year classes by experienced clinically oriented members of the faculty is limited to a relatively small part of the schools. The majority of the interviews of freshman-interns reveals that in many of the medical schools the lion's share of the clinical bedside training had been entrusted to the young teachers.

The latter, influenced and indoctrinated by the chiefs of their department, are vividly interested in theoretical medical research and have a healthy contempt for empirical medicine which cannot as yet be investigated by experimental methods. This is eloquently described by one of our most erudite academic teachers in the following words: "The atmosphere is experimental, the mood inquiring, the goal is understanding. The oft repeated aphorisms of the great clinicians are supplanted by information quoted from a variety of scientific journals."

Although the material taught during these years is far remote from clinical medicine, due to the active student participation, it is, nevertheless, of paramount importance. This two-year course in experimental physiology applied to patients is unique in the world and teaches the student to integrate physiological knowledge into clinical medicine. Thanks to this excellent preparation, the American physician, for the rest of his life, will always try to apply physiological principles to the understanding of disease. This knowledge proves to be a solid foundation for the clinical training at the bedside which, however, must be provided after the graduation, during the internship and residency years.

Since the two-year course of applied physiology at the bedside is an all important preparation for the post-medical-school training of our graduates, the last two years of the actual curriculum should be kept inviolate and intact. The few medical schools which permit their fourth-year students to work as junior interns—actually as interns—in hospitals, make a grave error. The favorable results of our medical schools are only possible because our institutions do not even try anymore to reach for the impossible, that is, to provide, in a period of four years, training both in basic theoretical medical fields and in applied clinical medicine. In this way the lack of emphasis on Hippocratic training in medical school, which at first view might impress as a weakness, ultimately proves to be the strength of our medical education.

This is only possible because, with true American know-how, we have enlarged our four-year medical school curriculum to a seven-to-eight-year medical training program by adding a mandatory internship and a nearly mandatory two to three years of residency. During the latter three to four years, true clinical medicine must be taught to our excellently prepared graduates; in other words, during this period the large part of medical knowledge which is empirical in nature must be put in the foreground. Although every opportunity must be sought to continue the indoctrination of the members of the house staff with the importance of results of experimental medicine, the latter cannot be placed in the center of the post-medical-school house staff training.

Hospital Educational Program

It is deeply regrettable that the greater number of the voluntary hospitals to which the teaching of clinical medicine during the internships and residencies has been entrusted have not succeeded in offering an attractive and effective educational program. "To follow a hospital-attendant through the wards and see what he does in his daily routine . . . is not medical education," Ewing wrote in 1916, and no truer words were ever written.

The small fraction of the numerous hospitals recognized for intern training which are actually chosen by the young graduates can be found in the small booklet containing the results of the National Intern Matching Program, issued every year on March 1. These figures clearly illustrate how few voluntary hospitals offer adequate teaching programs.

Personally, I have great respect and admiration for our budding graduates who do not succumb to the enticement of large monthly stipends, royal intern quarters, and lavish promises which can be summarized as "cows with gilded horns." Many of our future interns have only modest means and are, at the same time, burdened by heavy financial and matrimonial obligations. Nevertheless, they clearly prefer the hospitals which offer primarily a well-integrated teaching program but an inadequate financial reward and shun the hospitals where they will be abused as scribblers of medical charts, although higher emoluments and valuable fringe benefits are offered.

Many of the voluntary hospitals have understood that this unfortunate state of affairs could only be improved by organizing a plan of education for the young physicians who serve as interns or residents. For this purpose, in many voluntary hospitals a director of medical education has been appointed who must provide more systematic teaching both by lectures and by better organized ward rounds.

It has been brought out at previous sessions of this congress that the success of these well-meant efforts has been practically nonexistent as far as the recruitment of interns is concerned. It seems to me that the following point should be kept in mind.

Pure clinicians, mainly interested in empirical medicine, are often poor teachers. In this connection it must be emphasized that the approach to the diagnostic problem of a patient is exactly the same as the approach to a research problem—irrespective of the difference in the tools which are

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used in the attack on the problems. Only clinician-scientists who have been accustomed to tackle the difficulties of research problems know how to attack systematically the clinical problems which must be solved to find a satisfactory answer to diagnostic and therapeutic questions. Whether knowledge obtained by experimental methods or empirical knowledge obtained by observation and experience is used, the methodology which must be employed to tackle the problem remains the same. Thus, the pure Hippocratic clinician without interest in scientific research is usually an inefficient teacher, even of empirical medicine.

It would seem that the appointment of a clinical scientist as a director of medical education could considerably improve the educational programs of the voluntary hospitals. However, at all times it must be remembered that education can never be better than the teacher. Therefore, the director of medical education should not be a coordinator alone. Only if the clinician-scientist who directs the medical education is willing to do most of the teaching himself will the hospitals profit from the appointment of such an incumbent. In addition, he must organize weekly medicosurgical rounds, x-ray conferences, grand rounds and clinical pathological conferences, and other combined sessions so that his educational influence does not remain isolated to medicine alone but also reaches surgery and other departments.

In this connection it may be mentioned that in the history of American medicine the dynamic influence of the clinician-scientists on the progress of medicine has often made itself felt. When, thanks to the report of Abraham Flexner, a new era for medical education started in the United States, the newly appointed chiefs of departments were, of necessity, physicians and surgeons who had already made their reputation in clinical medicine and who, at the same time, had made contributions to the science of medicine. These clinician-scientists in their role as chiefs of departments made American medicine famous over the world and completely reversed the current of students which at the time ran from America to Europe. It seems possible that clinician-scientists might also be able to spark the teaching of medicine in the voluntary hospitals and attract American graduates as house staff members.

In the hospitals of the medical schools the attending staff usually consists of clinicians who have for years actively contributed to research in the department of medicine before they entered the field of clinical medicine. Most of these men usually continue their work in their old fields of interest. In most hospitals of the medical schools these mature clinician-scientists are the guiding spirits in the education of the house staff members. The purely scientifically and experimentally oriented members of the medical school faculty act only in a secondary, supportive role. This arrangement guarantees highly satisfactory and educationally profitable house staff assignments. This subtle balance would be disturbed and clinical teaching would suffer if the nonclinically minded medical school faculty would have too much influence on the bedside teaching in the hospital.

Let it not be said that such a situation can be easily remedied by the addition of a few good clinicians to the staff of such a department of medicine. As long as the upper echelon of the department unanimously looks down on empirical medicine, the students will accept this opinion. Young men are cruel critics, and, thus, the students will not refrain from demonstrating their disdain for physicians who feel that experience still plays an important role in the application of medicine at the bedside. In this hostile atmosphere the experienced clinicians will feel themselves to be unwelcome outsiders, and this will play havoc with their efficiency as teachers.

However, in far the greater part—perhaps even in all—of the medical school hospitals the clinician-scientist shoulders the major part of the clinical teaching. Hence, the number of interns and residents who flock to the medical school hospitals is large.

Summary

Thanks to the training and interest in research of the teachers in the medical schools, our medical graduates are well prepared for the progressive development of medicine which is bound to occur during their active medical life. In addition, they have the potentiality to develop into excellent clinicians during the post-medical-school years of house staff training. In the medical school hospitals the house staff training is highly satisfactory as long as the staff members who are clinician-scientists remain leaders in the bedside education.

The voluntary hospitals will only play a role in post-medical-school training if they put one or more clinician-scientists at the head of their educational programs. It follows that not only for the teachers in the undergraduate medical schools but also for the physicians responsible for the post-medical-school graduate training—both in university hospitals and in voluntary institutions—active interest and participation in research are mandatory requirements.

The teachers who are charged with the training of young medical graduates must be clinician-scientists, i. e., they must have, apart from their scientific orientation, a healthful respect for that part of medicine which is empirical in nature and is based on experience.

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RESEARCH ORIENTATION AND THE PRACTITIONER OF MEDICINE

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The research orientation and the practitioner of medicine is a subject that defies easy analysis and ready solution. The impact of research on the practitioner is just as important as the impact of research on the patient. As a matter of fact, the end-result is much the same. The practitioner is expected to filter out the good from the bad and recognize the practical applications of the results of these studies. The research physician should be in a position to disseminate practical and useful information to the practicing physician. On the other hand, the practitioner of medicine is in a situation where he, too, may do investigative work. I always think of that classic example in this regard, namely, Sir James Mackenzie's contribution regarding "Extrasystoles." After many years in practice and observing many instances of this disorder, he gave a most lucid analysis of the clinical significance of this type of cardiac arrhythmia. In the United States the historic work of William Beaumont and his famous patient, Alexis St. Martin, demonstrates what can be done when a situation arises that lends itself to clear thinking and patient application.

Patients are critical of the passing of the family physician and even suggest that socialized medicine is the answer. That is disturbing. Yet these same patients feel that "health" is a birthright and they should have access to all the latest achievements in diagnosis and therapy. These patients place an additional burden on the physicians. Not only must they be the "family doctor" but they expect them to keep up with all the sensational information so vividly described in the lay press.

Relationship of Research and Practice

Perhaps this change has occurred because of the influence of the "ivory tower doctors" on medical teaching. Perhaps medical schools are making stereotyped individuals out of medical students and suppressing intellectual curiosity. No doubt this has happened and is happening, but the recent trend in medical training in many institutions is in the direction of stimulating intellectual curiosity. If this training is more widespread and more young physicians develop this attitude, "research" or observation of the onset, course, and result of any given disease process might be better understood and, by the same analogy, better treated. As a result, the patient will benefit. It should be reemphasized that teachers of medicine should inculcate an attitude of thoughtful curiosity in the minds of medical students. The problems of diagnostic examination as well as the special problems that arise under these circumstances should be carefully analyzed. Available information referrable to these problems should be thoughtfully studied. The systematic pursuit and accurate documentation of the problems will make students better clinical observers and more appreciative of the research projects that are being done in these fields. It will eventually bring the practitioner of medicine and the research physician closer together.

Sir James Mackenzie pointed out better than anyone the opportunity for research in medical practice when he wrote: "Consider for a moment who is the individual in medicine who has the opportunity of seeing all parts of medical science in its true perspective. It is the general practitioner (i. e., the practitioner of medicine). He sees the conditions that predispose to disease; he sees its inception and the course it pursues, passing from the signs for medical treatment to the time when it calls for surgical interference. He sees the after-effects of the operation after the surgeon has claimed it as a success. If he is stimulated to inquire into the symptoms of the disease, he is brought in contact with every special department, and has the opportunity for estimating them at their true value."

What was true in Mackenzie's time is still true in our time. The practitioner of medicine is the backbone of medicine today. Though the field of each practicing physician is, in a sense, restricted, the horizons of adventure and observation are without limit. The practicing physician has a magnificent opportunity and duty to observe patients in this fashion and even add to the fundamentals of our knowledge of disease.

This is truly "research" of just as much importance as that of the laboratory worker, where modern buildings and elaborate apparatus seem to count for so much. When a physician runs into a perplexing problem in medicine, he should endeavor to spend some time in "investigating" that problem. Some of this information may be fundamental and worthy of publication. Indeed, it should be in the literature to help others. This is "fundamental research."

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To carry this a bit further, such research should be a great boon to the practitioner of medicine when he is faced with a complicated problem in one of his patients. His experience and documentation of that experience in his own office files is far more helpful than the textbook. They will be disappointed because there are few, if any, textbook cases in medicine anymore. Each physician's records should, if carefully kept, be a source of tremendous information and most helpful in meeting that physician's current problems.

Most practitioners of medicine are keenly aware of the importance of thoughtfully conceived and properly directed research. By the same token, they are greatly bothered by the enormous expenditures for so-called research. There is some justification for this worry when one considers the figures for medical research before and after World War II and 10 years later. In 1940, 45 million dollars was spent on research. Three million dollars came from government, 37 million from industry and philanthrophy, and 5 million from endowment. In 1947, 88 million dollars was spent on medical research—28 million from the government and 60 million from other sources. In 1957, 330 million dollars was spent (over half of this went to universities and medical schools); 186 million dollars was provided by government funds, 90 million by industry, and 35 million by philanthropy. It is only fair to add that both these latter figures are larger according to more recent surveys. Mr. Francis Boyer, chairman of the board of Smith Kline & French Laboratories, stated in an editorial in *Science* in August, 1958, that "a productive medical research program requires not only a lot of money but considerable wisdom in its spending."

It has been voiced that there is not adequate screening of the research programs that obtain funds from government sources. This is not entirely true. Yet, there are loopholes that are recognized. This is set forth in the final report of the consultants quoted in "Advancement of Medical Research and Education Through the Department of Health, Education, and Welfare," published in June, 1958; two of the conclusions were that "the system of national advisory councils and study sections be retained and expanded as required" and that "base grants for research and training be distributed on the basis of professional judgments of the unique capacities and needs of each institution, and not made to finance specific projects or programs."

In spite of the increasing "watch-dog" attitude toward research funds, many practitioners of medicine feel that Charles Pinckney's adage of "millions for diagnosis and not a cent for treatment" might well be paraphrased to "millions for research and not a cent for service." The schism between the research physician and the practicing physician is a real one and must be approached with some sense of reality.

Much has been made of having more medical schools and more medical students. This is reflected in a statement made by Surgeon General Burney: "Unless construction funds become available on a much larger scale than has heretofore been contemplated, the output of physicians will not keep pace with population growth and the needs of the nation for research workers will not be met." When one thinks about this statement, it is apparent that Burney feels that the roles of the practitioner of medicine and the research physician are inseparable. What is good for one benefits the other. Research should always be regarded as one of the activities of a teaching hospital and, perhaps, some of the better-equipped nonteaching hospitals. Though research is so regarded, much of the fundamental work is done in the laboratories of the "pure sciences." Research should be an important part of any hospital in that the unique training along these lines develops critical judgment. Even a superficial exposure to research is important. No earth-shaking discoveries may be made, but that experience makes the practicing physician appreciative of the painstaking and slow, or even relaxed, effort of the research physician.

Only a few, and I may add very few, physicians are equipped intellectually to do research. Many physicians are taking part in research programs that are nothing more than proving or disproving something already known. This is probably important, but there have been few striking fundamental discoveries when one considers the over-all number of projects going at the present time. I would be the last one to suggest that all these projects be curtailed or drastically limited. After all, something fundamental may come from a project of the utmost simplicity.

Dissemination of Knowledge

The research worker should not scorn the practitioner of medicine because he is not laboratory oriented. All of us cannot be. The practicing physician, if he is conscientious, can be of the most tremendous aid to the research physician by applying of principles discovered in the laboratory. It is the duty of the research physician to recognize this fundamental fact. The research physician and the practicing physician must work together. The one complements the other. The results of investigation must be properly disseminated among the practicing physicians to be appropriately applied to the care of the patient for whom it was originally planned.

That raises an almost insurmountable obstacle. Should this be done at medical meetings? Should it be introduced by having the results appear in the medical literature? Or should this information be spread far and wide through the drug house contact man and advertisement?

The obvious difficulties of accomplishing this by medical meetings hardly merits comment. Granted, the number of medical meetings is increasing in an amazing fashion. The various specialties and subspecialties plus numerous general groups have annual meetings and regional meetings. This outlet for information would seem sufficient. However, the number of practicing physicians reached is surprisingly small, forming but a minimal segment of all physicians. The medium of meetings leaves something to be desired because the information cannot be studied with care. I am sure that all of us have heard the results of superb investigation at a meeting but are unable to recount this information with any degree of accuracy. Meetings do serve their purpose in a limited way but are not the complete answer.

It is unfortunate that there is such a profusion of medical journals. No one practicing physician could possibly read all the journals; that would be a full-time job, even a life-time job. It is unfortunate, also, that so many articles appear for other reasons than to convey worthwhile information to the medical profession at large.

It is obvious that the results of research should not be given over to lay people. Yet this is happening in an ever-increasing way. It is astonishing that so much has been left to the pharmaceutical houses. This information is placed before the profession by a phenomenal advertising program that appears in many, but not all, medical journals. It is often presented in a more striking and eye-catching way than the text of these journals. Remarkable claims are made that are frequently misleading and lead to the masking of disease processes that would not happen if the medical profession were more alert. A brief illustration is the type of "cure-all vitamins" that contain folic acid and vitamin B_{12}. These remarkable capsules may well obscure an otherwise readily recognized case of pernicious anemia. The drug house contact men are an earnest, hardworking, and well-intentioned group. We might well ask ourselves if this is the proper way for the practicing physician to learn about the results of research. Too often anything that is new with an intriguing name seems to be considered the latest thing, the final work of some intensive investigation, whereas it is frequently something that has not proved its worth but is dressed up in a new costume with a fancy name.

Beckman, in a recent article entitled "To Use the New Drug or Not to Use It—That Is the Question," stated, "If a new drug is derived from an old folk remedy, the chances are that it is worth paying attention." He also stated that "all drugs, even the very best and least noxious of them, are psychologically and physically potential toxic agents." He stresses that, as a result of research, new drugs have brought new responsibilities to the manufacturer and to the physician. The former should be sure to explore all possible reactions of a new drug. The latter should learn how, when, and when not to use these highly potent compounds.

Would it not be an excellent idea to have a screening service whereby all information on worthwhile research could be catalogued? Such a method would give an excellent cross section and birds-eye view of proved research data. It is pertinent that the Institute for Advancement of Medical Communication has taken on the task of clearing the jammed channels of medical communication. Heading the list of projects under development by the institute is a specific plan for speedy interchange of research findings among investigators. The primary aim is to develop and test improved methods of communication in three main channels: (1) among research investigators, (2) between investigators and practitioners of medicine, and (3) between teachers and students in medicine. Such methods should be explored. Waldo Chamberlin, professor of government at New York University, has felt that national efforts along these lines would be "wasteful, inefficient, and expensive." He champions such a service or agency within the framework of UNESCO. These steps are in the right direction.

By the same token, the practicing physician should not wait to be spoon-fed but should avail himself of the opportunity to review the collected information, which reminds me of something I read the other day. I can't quote it, but, to paraphrase it, it is stated that there is no great objection to making the diagnostic road smooth but there is strong objection to allowing the mind to coast along in neutral.

The optimum in the practice of medicine is reached, unquestionably, by the acquisition of the art in the practice of medicine plus a practical application of the results of research. It is the obligation and even the privilege of the practitioner of medicine to bring all the wonders and achievements of medical research to patients, for whom it was originally intended. If each of us would honestly apply these principles in our daily practice, the rewards of research would far exceed all the worldly wealth expended to make such research possible.

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MAINTENANCE OF THE SYNERGISTIC RELATIONSHIP OF EDUCATION AND RESEARCH IN MEDICINE

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The profitable interplay between research and instruction in the educational process is perhaps best emphasized by the defensible statement that a vigorous medical education program is no more possible in the absence of research than in the absence of instruction itself. This was recognized at the turn of the century by a small number of institutions which initiated medical education as we know it today. We have come a long way since that time but have not really experienced this interplay on a broad scale until quite recently.

Subsequent to World War II, the nature of the relationship has been well understood—but not so the problems of its maintenance. These are inadequately studied and only infrequently acknowledged. For "maintenance" is a practical term. Given the desirability, even the essentiality, of achieving conditions which permit the cumulative effectiveness of medical instruction and research to be greater than the sum of the two, how—in specific terms—can this be accomplished? Whose responsibility is it? Where should the money come from, and under what circumstances should it be made available? These are pressing public issues as medicine faces the twin challenges of growth in size and in complexity.

Areas of Concern

There are three areas in which the maintenance of the synergistic relationship of teaching and research is of primary concern. The medical institutions themselves must have the resources and the resourcefulness to combine in the measure they deem appropriate the elements that make up a modern environment for teaching and research. This implies breadth (in terms of the range of disciplines and specialties involved); balance (in terms of the relative emphasis on teaching and research); stability (in terms of the basic financing of the institution and its full-time faculty); and independence (in terms of the ability of the institution to set up and pursue its own objectives). As one appraises our medical institutions today in relationship to their capacity to meet the challenges of tomorrow, it is abundantly evident that the principal factor will be resources rather than resourcefulness.

A second area of concern in the matter of balance between teaching and research is in the substance of the undergraduate and graduate medical educational experience itself. Certainly such factors as the increasing demands placed on physicians for understanding of diverse fields of medical science and the increasing importance of medical school and related environments as a source of scientists and teachers, as well as physicians, highlight the need for weaving the basic sciences—the behavioral and the physical as well as the biological—more closely into the fabric of our teaching institutions.

A third area for concern in the question of medical teaching and research has to do with the experience and contributions of physicians, scientists, and teachers who have completed their formal training but for whom education and research are a never-ending process. It is of the utmost importance that the mechanisms for interchange and refreshment be strengthened and expanded to permit the individual to advance in his own and related fields, for medicine has changed dramatically in the past 20 years and certainly will continue to do so. Teaching must be of a nature that permits subsequent growth of both student and teacher.

Although there are some who dissent, one feels a strong consensus that the present "balance," if you will, among teaching, research, and service in the United States represents the public and professional interest and is reasonable. Assuming this to be true, the problem is to maintain such balance in the years ahead. This problem can best be examined in the context of the medical school, where teaching, research, and service are inseparable.

I feel that the medical schools are at another critical stage in their general evolution. There is pressure to provide more physician training and at the same time to modify the substance of medical education. There is also pressure to expand the research base of the institution. These pressures become critical in the face of inadequate funds for operations and for plant expansion. Expressed in specific terms, this means an inability (1) to establish a suitable number of rewarding career positions; (2) to modernize, expand, or replace inadequate facilities; and (3) to develop institutional goals that are both reasonable and attainable.

Viewed in the more limited context of teaching and research, it is quite apparent that today the research function is well supported and is on a relatively firm base in both quantitative and qualitative terms. Funds are available from a wide variety of sources to finance research projects, research training, and research facilities. The federal government is the primary source of such support. But nonfederal sources, too, tend to give support more freely to research than to teaching or the general operations of the school.

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Since it seems likely that funds in support of medical research will continue to increase, and since it is not clear from where the needed funds for the teaching process will be derived, those who design and administer the research support programs have a special responsibility to take into account and strengthen the capacities of the schools to carry out their total mission.

The program of the U. S. Public Health Service is a case in point. Through its appropriations from Congress, a diverse pattern of support for research has come into being. In the aggregate, the programs this year provide more than 125 million dollars to the medical schools alone, including nearly 73 million for research projects, 35 million for training, and 17 million for research construction. In some schools, these grants and awards constitute as much as one-third of the yearly expenditures. Under these circumstances, the terms and conditions of Public Health Service support become matters of deep concern to the schools and to all those who are interested in their capacity, stability, quality, and independence.

The Twenty-School Study

As part of its continuing appraisal of the impact of its programs on the schools and related institutions, the Public Health Service has recently initiated—with the cooperation of the Association of American Medical Schools and the American Medical Association—an intensive, short-term study of 20 representative medical schools. The study is not yet complete, but certain trends and views are of interest even in preliminary form. They are stated here as a series of impressions gained by our staff as they have visited the schools and begun to analyze the data the schools have provided.

First, although the principle is axiomatic, there seems to be increasing awareness that good teachers at all levels need an opportunity to do research, and vice versa, and that it is part of a school's responsibility to make provision for its faculty to do both.

Second, although several years ago the number of medical schools with the funds and facilities necessary to permit faculty to engage in substantial research was small, that picture has changed. At present—whether one uses dollars, number of faculty members, or apportionment of faculty time as his measure—essentially all of the medical schools being studied are moving toward a 50-50 division between teaching and research. In some schools, the dollars and time spent on research actually exceed those expended for teaching.

Third, in general, the relative emphasis on research appears to be greater in private than it is in state institutions, but there are notable exceptions to this. Certain of the schools have indicated an increase from 10 to 50% in their research components during the past decade.

Fourth, as part of our study, the schools were asked to project their distribution of research and teaching effort for the next 10 years under two assumptions: (1) with federal funds held constant and (2) with federal funds increasing at whatever the individual school felt to be an ideal rate. Under both assumptions, schools which now have a relatively low research expenditure propose to increase it. Given a free hand, private schools project a greater emphasis on research than state schools.

From these sketchy observations, it would appear that research in medical schools is becoming more and more a primary function. It will undoubtedly be necessary for the schools to recognize the inevitability of permitting teachers to expand their research function. One would wish that the granting agencies could be equally broad minded about permitting research-supported people to engage in or expand the teaching function. I am reminded, for example, of the fact that our own research fellowships carry a limit of 10% on the amount of time that can be devoted to teaching.

Our study (since our primary mission at the National Institutes of Health is the conduct and support of medical research and the development of resources through research training and research construction programs) is focused on the impact of our present programs and on the ways they should be changed in character and may change in dimension in order to meet the needs of medical science and of society in the years ahead. Naturally, most of the facts and opinions we seek have to do with the research side.

Support of the Teaching Function

It will come as no surprise to you, however, as it was not to us, that the schools studied put funds for construction of teaching facilities as their first priority need and funds for general operating expenses second.

In this, it seems to me, lies the primary challenge to the maintenance of synergism between the research and teaching functions in medicine. Established and accepted sources, both public and private, today support the research function adequately. The educational function, on the other hand, is restricted from its needed growth, both qualitatively and quantitatively, because adequate funds are not available.

This is a painfully familiar theme to those of you who have long been concerned with our medical institutions and have evidenced that concern in your personal and professional lives. It is a problem that will certainly be solved, but slowly and on the basis of small individual steps and public and professional awareness leading ultimately to consensus and united action.

In the meantime, given only the existing patterns of support, some things can be done to help avoid placing even greater stresses on our medical schools and related institutions. They all stem from under-

standing of the basic interdependence of the functions of the schools, requiring the terms and conditions of support to be designed with an awareness that no one function can reach its optimum level unless the other functions are maintained to permit a balanced and unified total effort.

For the different sources of support—private or public and federal, state, or local—this responsibility to support a part in the context of the whole will be evidenced in varying ways. For the National Institutes of Health, for example, it takes the form of continuous program modification, within our statutory authorities, so that needs that become evident to us are met to the best of our ability. In this, it must be remembered that NIH, as the principal medical research arm of the federal government, must be responsible to the people and to the Congress, must operate within policies set by the executive branch, and, at the same time, must be responsive to the needs of scientists and their institutions.

At any given point in time, elements of our program are in the process of modification, since they seek to be responsive to changing needs. Today, for example, we are seeking, through our legislative and appropriation processes, to modify our programs to achieve four primary objectives: (1) the ability to pay the full costs of the research supported by our grants, instead of only part of such costs as now provided under our 15% limitation on the payment of indirect costs: (2) the authority to provide for strengthening and stabilizing the research base by making available to the medical schools and related institutions what we now call institutional research grants (such fluid funds for research purposes, supplementing but not competing with research project grant funds, would permit the schools to regain a measure of discretion and control over their own research activities); (3) measures which will permit the schools to increase the number of full-time positions in research with faculty tenure; and (4) a gradual change in the specificity and duration of research project grants, so that they are awarded for less rigidly defined studies and accorded support over longer periods of time.

All of these are derived from our perception of the needs of the schools, the long-range as well as the immediate strength and productivity of their medical research effort, and the established role of the federal government as having direct interest in the medical research component of the nation's institutions of higher learning.

I cannot surmise what the fate of these concepts may be. But I thought I should share our thoughts with you who are vitally concerned with the many factors influencing future developments in medical research and medical education, recognizing—as I know you do—that these and all other major modifications in our programs must be measured in a wide variety of professional and public forms before they can be brought into being.

Such program developments, whether they deal with the substance of science or a mechanism for its support, suggest that our attention is now centered primarily on the needs of the institutions which are the heart of our nation's research and teaching effort.

Superseding all other needs, in the long run, is the need of the schools to achieve, and to speak with, a strong and unified voice. The hopes and expectations of millions of Americans and of people everywhere are centered in the medical institutions, and the groups with a special interest in the schools are willing, even eager, to speak in their behalf. It is right that they should do so. But the profession must not depend solely on such support. A way must be found for the schools themselves to capitalize on the latent power and prestige that is implicit in their position of leadership in medical affairs.

POSTOPERATIVE PANCREATITIS.—Acute pancreatitis is found occasionally as a postoperative complication, mostly after biliary tract surgery and after gastrectomies. This is a serious, often fatal, complication. . . . Since a fatal outcome may possibly be prevented by therapeutic measures directed against the pancreatitis, it is of utmost importance to make the diagnosis in time, and the only means of doing this is the serum amylase test. If the serum amylase level is elevated following operation, we may well assume that we are dealing with a pancreatic complication. One of us has made it a routine to order serum amylase tests during the first postoperative days if the pancreas was traumatized at operation and likewise after all upper abdominal operations if the postoperative course is not as smooth as anticipated. We had a number of cases with postoperative rise in serum amylase. All of them recovered uneventfully after being placed on a pancreas-protective regimen, which, in addition to routine orders, consisted of repeated intravenous administration of 6% Dextran solution, one of the best means to combat pancreatitis.—H. L. Popper, M.D., and H. Necheles, M.D., Ph.D., Pancreas Function Tests, *The Medical Clinics of North America*, March, 1959.

MAJOR FACTORS INVOLVED IN RECONSTRUCTING THE MEDICAL CURRICULUM

John A. D. Cooper, M.D., Ph.D., Chicago

The ferment and rapid changes characterizing the status of medical education in the past decade give every promise that future developments will cut deeply into the fabric of our present patterns for the preparation of the physician. There are probably a number of as yet unforeseen factors which will effect further alterations in our present concepts of the curriculum. Out of the many possible ones, I have chosen three topics to bring into focus in my discussion. They fall in the general areas of the student, a liberal education for medicine, and the changing social character of our population.

The Student

I would first like to turn attention to the students who will enter our medical schools of the future. A basic and integral part of any educational program, their qualities and abilities help mold to a considerable extent the nature of the program.

Despite their importance in the scheme of things, far too little attention has been paid to improving the quality and size of the pool of applicants from which choices can be made in selecting our classes. Projective reports of increasing numbers of applicants to medical schools in the next decade do not give information about their quality. There is good objective evidence that the quality of the applicants and in turn of those accepted is declining. As recently as 1950, 40% of enrolled medical students had premedical grade point averages of A, an equal number had a B average, and about 20% entered with a C average. For the 1955-1956 class, only 16% had an A average, 71% had B averages, and the remainder had C averages. There has been little change in the 1956-1957 medical class.[1] The figures I have given represent averages, and there is considerable variation among the individual medical schools. Some are blessed with student bodies in which 70% have A averages in their premedical preparation, but some are not so richly endowed and 70% of their students have C averages.[2] Although grades do not entirely establish suitability for the study of medicine or subsequent practice as a physician, they certainly serve as one of the guideposts.

This turn of events, unless it can be reversed, will create a real dilemma—the increasing mass of scientific knowledge in medicine, the medical sciences, and the behavioral sciences and the deepening complexity of medical practice call out for students with even greater intellectual capacity and dedication than in the past. If students are not equal to this heavier burden, there can only be compromise with the high level of education necessary to properly prepare them for the profession.

The changing social character of the student is probably responsible in part for the change in the attractiveness which medicine holds for him. Modern youth seems less given to dedicated pursuits and the desire for achievement. Idealism is on the wane, and the individual has difficulty in establishing and maintaining values and goals which differ from those of the masses. Conformity and homogeneity characterize the age, and there is every promise that the trend will not be interrupted in the future. These attributes do not mark those who are interested in and willing to undertake the long and difficult preparation for medicine and to accept the demands which practice requires.

Medicine is finding increased competition for the pool of top-ranking students because it no longer occupies the unique position as a profession which it held in the past and shared largely only with law and the ministry. The professions open to the college graduate are now much broader, and they provide the prestige, intellectual satisfactions, and financial rewards comparable to those offered by medicine. Furthermore, faculty members in the college are in an ideal position to pick out the best students in their classes and convince them to abandon their original intent to study medicine and elect instead graduate study in the department. The letters of recommendation which come to admissions committees with the statements "He is too good a student for medicine," or "I have tried to convince him to follow a career of research in chemistry," tell the story of the cases where they have failed. Medicine has no opportunity to effectively combat this spiriting away of our best students.

The vast sums of money available for fellowships and research assistantships in the expanding research budgets almost guarantee the total expenses of graduate education for all but a small fraction of students in the physical, biological, and behavioral sciences. Medicine has no equivalent source of subsidy for its students. In addition much research, even in areas traditionally reserved for medicine, is being carried out by investigative teams which include both physician and nonphysician scientists. The members of the group participate essentially as coequals, and the physician oftentimes does not rank above his colleagues, even though the problem being studied is directly concerned with a disease process. This new freedom of opportunity permits talented young men and women to partici-

Associate Dean, Northwestern University Medical School.
Read before the Annual Congress on Medical Education and Licensure, Chicago, Feb. 10, 1959.

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pate in challenging and rewarding activities in fields closely related to medicine without the requirement for an M.D. degree. The physician retains his unique status only in being responsible for the patient's welfare, a privilege which apparently has diminishing appeal for the high-ranking modern student. As the scientific and technological bases of our existence further broaden, we can anticipate only increased competition by engineering schools and graduate programs outside of medicine for the relatively ever less adequate pool of good students.

The inordinate length and cost of the total educational program for medicine, measured not only in the monetary outlay but also in the years of income which it denies, is certainly having its influence on career choices. The biochemist in a graduate program can begin to support himself and a family even before he receives his Ph.D. degree. Engineers have little difficulty in finding good jobs after graduation. Because of the student's long period of study in medicine during the years when his contemporaries in other fields are starting their families, and his prospect of additional semi-indentured service as an intern and resident, medicine is finding increased difficulty in competing with the attractions of other professions. The declining fraction of college students seeking a career in medicine and the well-established increased future needs for physicians compound even further the predicament in which medicine may find itself.

There are partial solutions to these problems already apparent: an active recruitment program in the high schools and colleges similar to the one so successfully employed by engineers, well-considered plans for shortening of the over-all program, and the granting of higher professional and economic status to the physician in specialty training.

If we fail to attract into medicine an adequate number of top-notch students who can acquire and use the broader and deeper understanding of basic biology and behavioral sciences in the care of patients, our educational program will of necessity have to lower its goals to fit the students with which it is provided.

Liberal Education in Medicine

The rapidly mounting mass of knowledge basic to medicine and the medical sciences is posing serious difficulties in properly relating it to patient care and the present patterns of medical education. There is every likelihood that the difficulties will increase, because knowledge is increasing not linearly but exponentially.

Hope for success in meeting this challenge requires that bold action be taken to reappraise our present concepts for preparing the physician. Although we are quick to denounce premedical education directed toward the accumulation of facts rather than the deliberate cultivation of the power to think and to think painstakingly, we are loath to apply the same criteria in evaluating our own educational programs. We ask that the colleges not give us computers which regurgitate without modification or understanding the facts which have been programmed into them, but all too often the educational program for medicine lays stress on these accomplishments.

Experimentation is clearly called for, and its beginnings are already visible. As Darley pointed out in this Congress, the methods of patient care and medical education must be subjected to the same study and experimentation accorded to the scientific disciplines. The experiments now in progress are providing valuable information, but their scope is still inadequate. As they spread there will be an effect on the medical curriculum through the diversity which they foster.

One of the probable directions in experimentation will be the introduction of greatly increased flexibility into the present, still overrigid curriculum. The flexibility will appear in the total length of the educational span for medicine. Students will be permitted to progress at the rate which their emotional development and scholastic achievements dictate. This philosophy, which has pervaded the thinking at the secondary school and college level, has made little inroad into medical educational circles.

Increased flexibility will permit design of programs to fit the interests and requirements of the individual student. Every graduate of the medical school will not have had the same lock-step curriculum as his classmate. Acceptance by medical educators and licensure bodies of the thesis that the sum total of medical knowledge cannot be imparted to the undergraduate medical student and that students come with individually varying needs and resources will open up the possibilities of constructing a program of "liberal education" for medicine. There is little doubt that there will be far-reaching effects on the medical curriculum.

Changing Social Character of Our Population

The third factor which I wish to consider that will probably have an effect on medical education is the changing social character of the American people. This effect will occur indirectly through its influence on medical practice and the concept of the physician's responsibility for the emotional problems of his patients.

The rediscovery of the patient and the concept of comprehensive medicine describe important directions being taken in modern medical care. The importance of orienting medical students to look beyond the pathological process and treat the patient as a whole is receiving wider acceptance. Opportunities for the unhurried recognition of factors within the patient and his ecology which might be involved in the aggravation or cause of

his illness, or in the promotion of his health, are beginning to be supplied in the clinical teaching programs of an increasing number of medical schools. One important facet of the "whole patient," however, has not received the attention it is due—the way in which he is changing in our developing culture. This information is becoming of increasing importance because of its influence on our concepts of the role which the physician can be reasonably expected to play in coping with the character disorders which he finds in his patients.

The marked alterations taking place in the social character of our time have been widely chronicled by Riesman and associates,[3] Commager,[4] Wheelis,[5] and others. The influence which these changes have exerted on the practice of psychoanalysis has been pointed out by Wheelis in his book entitled "The Quest for Identity." I would like to broaden the ideas which he develops to wider areas of medical practice.

We are living in an age of uncertainty. As Wheelis has written, "The questions of adolescence—'Who am I?' 'Where am I going?' 'What is the meaning of life?' receive no final answers. Nor can they be laid aside. The uncertainty persists. The period of being uncommitted is longer, the choices which terminate it more tentative."

The neurotic pattern and personality problems are evolving from the symptom neurosis so clearly described by Freud to character disorders whose amelioration requires provision for the patient of a value system, answers to the "confusions of the age," and direction in deciding what is worth fighting for and how strong the fight should be. The enormity and nature of the help required by the patient in orienting his life raise serious questions about the part which the physician should take in helping with their solution. The attention and support which the patient must have in solving the problem of his identity are of a different order of magnitude than those required for freeing man from the internal tyranny of his character. The approaches and techniques developed to cope with yesterday's problems do not meet the needs of a completely different type character disorder.

The enormity of the challenge presented by the uncertainty which pervades our culture will make it necessary to develop new techniques. Unless there is a marked increase in the relative number of physicians to the population, there will not be sufficient time in the physician's day to deal with more than the psychological parameters most closely related to the presenting disease. Complete rehabilitation of the patient will require the interplay of a team of which the physician is only one member. The medical schools must foster the development in their students of the attitudes and knowledge which will permit them to take the fullest possible advantage of the help which this combined approach can offer. Psychiatry and psychology as they are presently conceived are not designed to provide individuals with values and goals—it would appear that the sociologist may supply the direction which the problem requires.

These represent three factors which I think may have considerable influence on our education for medicine in the future—there are many others that I might have chosen but time and clouding of the crystal ball suggest that I end here.

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POSTOPERATIVE STRICTURES OF THE BILE DUCTS.—Man-made strictures of the bile duct . . . account for 80% of all the so-called benign or simple strictures of the bile ducts. . . . Postoperative stricture of the bile duct is one of the most tragic complications seen today in the practice of abdominal surgery. . . . The tragedy of this calamity can be gauged by remembering that 70% of the patients are women, 40% are under the age of 50, and only about 60% of these cases are permanently cured by a reconstructive procedure. It is estimated that some 30% of such patients will eventually die from the attempts made to repair the stricture or from the effects of intermittent or complete biliary obstruction. Many of these unfortunate patients have had several unsuccessful operations for relief of the obstruction before being referred to a specialist in this field. . . . It is impossible to estimate the incidence of postoperative stricture of the bile passages, but there is no doubt that injuries of the common duct related to cholecystectomy have increased, and it cannot be questioned that the number of common duct injuries is much too great.—R. Maingot, Post-Operative Strictures of the Bile Ducts, *Annals of the Royal College of Surgeons of England*, March, 1959.

CLINICAL NOTES

COMPRESSION FRACTURES OF THE THORACIC VERTEBRAE IN A PATIENT WITH TETANUS

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Tetanus is a disease caused by an anaerobic bacillus, Clostridium tetani, and characterized by stiffness of the jaw and tetanic spasms of the neck and back. The agent causing tetanus is found in soil and in the gastrointestinal tract of man and many animals. It has been isolated occasionally in man from the body surface and oral cavity. Essential to the development of tetanus is the preexistence or fresh deposit of spores in tissues favoring their growth, i. e., traumatized, inflamed, or necrotic tissue. On occasion such conditions prevail without trauma, and in these tetanus may develop without any apparent wound. The case to be presented is in this category.

The tetanus bacillus elaborates a toxin affecting the anterior horn cells of the brain stem and cord and the myoneural end-plates. Thus, the chief clinical manifestation is tonic spasticity of various voluntary muscle groups, and the symptoms vary with the muscles involved. On this tonic spasticity (rigidity) are imposed intermittent tonic spasms (tetanic convulsions).

The onset is usually marked by restlessness, generalized aching, irritability, difficult swallowing, and fever of 100 to 104 F (38 to 40 C). Stiffness of the jaw is the most common initial symptom and is due to masseter muscle spasm. As the disease progresses, rigidity of the neck, back, abdomen, and extremities becomes more pronounced, and there may be a grotesque grin due to involvement of the facial muscles. The masseter muscle spasm becomes severe and restricts mouth opening (trismus).

Tonic spasms are frequent, brief, painful, and accompanied by sweating. The teeth are clenched, the back and neck are arched (opisthotonos), the abdomen is taut, the extremities are rigidly extended, and the patient cannot cough or speak due to contraction of the muscles of respiration. If the spasm lasts long enough, interference with these muscles (diaphragm and intercostal and glottic muscles) can produce anoxia, cyanosis, and even death. The cause of death, however, is usually less apparent and is generally attributed to exhaustion.

The symptomatology is quite varied, especially at the onset when there may be headache, chilliness, stiffness of gait, abdominal pain due to muscle spasm, pain in the back and neck, and tongue biting. In those patients who recover, the signs and symptoms reach maximal intensity and then gradually recede.

From the Alexian Brothers Hospital.

According to the "Textbook of Medicine," edited by Cecil, Loeb, and others,[1] there are no laboratory procedures which are helpful in the specific diagnosis or management of tetanus. It further states that bacteriological examination as a means of diagnosis not only is almost worthless but also may be dangerously misleading.

Treatment in tetanus is based on sedation to control the irritability of the nervous system responsible for muscular rigidity and spasms and on destruction of the toxin or of the bacillus elaborating it. Of almost equal importance is the use of antibiotics to control the frequent complication of pulmonary infection.

A common complication of tetanus in children is compression fracture of several thoracic vertebrae. Caffey [2] states that Dietrich, Karshner, and Stewart found compression fractures of the thoracic vertebrae in 70% of a group of children who had recovered from tetanus. One or more segments near the apex of the thoracic curve were affected. Veronesi [3] found "vertebral changes" in 87% of a group of tetanus patients who were 1 to 20 years old. He described flattening, sometimes considerable, of the thoracic vertebrae, especially T-4 through T-7. The superior portion of the body was usually involved. This article was based on work done in Brazil where tetanus is common and was published in 1956. From then to September, 1958, the medical literature provided only two references to vertebral fracture,[4] and these were from Russia where tetanus is also probably common. Each reference concerned fractures of the thoracic vertebrae in a child.

Report of a Case

The case of tetanus to be reported was considered noteworthy because multiple compression fractures of the thoracic region of the spine developed in the course of the disease and because the disease occurred without a visible wound or trauma.

The illness began in this 16-year-old boy with chilliness, diffuse backache, stiffness in rising out of chairs, and lassitude. The next day the jaw was stiff, markedly limiting opening of the mouth, backache was severe enough to prevent sitting erect, thirst was prominent, and swallowing was so painful that only fluids were taken. The patient described

this symptom as a "very sore throat." That night there was fever of 103 F (39.4 C), restlessness, and groaning due to generalized aching. During the next two days there was chilliness, fever, poor appetite, epigastric soreness, inability to walk straight, painful stiff neck, and backache so severe that a pillow had to be placed behind the back to permit sitting. At this time he was seen by a physician who promptly sent him to the hospital.

Fig. 1.—Normal lateral thoracic part of spine.

Examination of the boy on his admission to the hospital revealed the temperature to be 98.6 F (37 C), pulse 98, respirations 18 per minute, and blood pressure 130/60 mm. Hg. There was pharyngitis and gingivitis. The tongue was inflamed and showed several shallow ulcers. The jaw was stiff, greatly restricting opening of the mouth. The muscles of the neck, face, and back were stiff, and coughing or turning caused pain in the back. The abdomen was rigid, and there was left hypochondriac tenderness. There were crepitant basal rales bilaterally. There was no history of a previous significant illness, no history or evidence of a wound or contusion, and no history of immunization against tetanus.

Because of the basal chest rales, posteroanterior and left lateral chest films were made, as is routine in this hospital. There was haziness in the right costophrenic sinus area consistent with pleuritis or atypical pneumonitis. On the left lateral view the thoracic vertebrae appeared normal (fig. 1).

During the next two weeks, the patient had a temperature of 100 and 101.4 F (37.8 and 38.5 C) on the first two days, but thereafter fever was insignificant. Prominent features were frequent, daily, brief, painful tetanic spasms of the neck and back; opisthotonos; trismus; frequent troublesome cough with yellowish expectoration; painful swallowing restricting food intake to fluids and occasionally preventing even that; fetor oris with gingivitis; and ulcerative glossitis. There was also poor appetite, pain in the chest and abdomen, and occasional tongue biting.

There were three episodes of dyspnea and cyanosis associated with efforts to cough and expectorate. The first lasted 10 minutes and produced brief syncope; the other two were shorter. All were relieved by placing the patient upright. During these attacks the patient felt that he was strangling or choking, and he could not cough or speak.

Aching in the thoracic region of the spine became severe during the second week, leading to x-ray examination of the cervical and thoracic regions of the spine on the 19th day of the illness. The cervical region was normal. The thoracic region showed compression fractures in the bodies of T-3 through T-9 involving the superior portions. T-5 showed the greatest compression, amounting to 60%. There was equivocal anterior subluxation of T-3 and T-4. Thoracic kyphosis was slightly increased, the apex of its convexity being at T-4–T-5 (fig. 2). The patient then was fitted with a back brace.

The laboratory findings were not diagnostic. The entrance examinations showed 1+ albumin in the urine; leukocytes, 11,000 per cubic millimeter, with 5 eosinophils; negative serology; and a sedimentation rate of 34 mm. (normal 0-9). The cerebrospinal fluid was normal. No cells were seen in it, and a 48-hour culture was negative. A throat culture did not produce any specific growth. A gum swab on Gram staining revealed many mixed organisms. Culture showed a mixed growth resembling alpha streptococcus, Bacillus subtilis, nonpathological Neisseria, and Hemophilus hemolyticus. The following blood analyses were normal: calcium, phosphorus, urea nitrogen, acid and alkaline phosphatase, total protein, and albumin and globulin levels.

Hospital treatment included administration of analgesics and aspirin, as needed for pain; cough medicine, as needed; sterile penicillin-dihydrostreptomycin for suspension (Combiotic), one vial daily for the first three weeks; chlorpromazine (Thorazine) hydrochloride, 100 mg. daily intramuscularly for the first two weeks, 150 mg. for the third week, 200 mg. orally daily for the next three weeks, 100 mg. daily for

Fig. 2.—Lateral film of thoracic part of spine showing compression fractures in bodies of T-3 through T-9.

one week, and then discontinued; methocarbamol (Robaxin), 5 mg. four times daily, until improvement began, then decreased gradually and discontinued at the end of the seventh hospital week; phenobarbital, 2 grains (0.12 Gm.) daily for the first week, then 4 grains (0.25 Gm.) daily until discontinued at the end of the eighth week; diphenhydramine (Benadryl) hydrochloride, 50 mg. twice daily from the third week through the remainder of the hospital stay; diphenyl-

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hydantoin (Dilantin) sodium, 1.5 grains (0.1 Gm.) twice daily for the two and one-half weeks in the later part of hospital stay and then reduced to 1.5 grains daily for the remainder of the hospitalization; and 50,000 units of tetanus antitoxin during the early part of the illness, followed by three doses of 5,000 units at spaced intervals.

The symptoms reached their peak coincident with the discovery of the spinal fractures. Thereafter they began to recede slowly and intermittently, although opisthotonos and infrequent tetanic spasms were still present at the end of the fourth week. At the end of the seventh week there were no symptoms or findings of tetanus. Repeat films of the thoracic region of the spine at this time did not show any change from the first films other than the development of osteoporosis due to inactivity.

The patient was discharged on the 61st day of the illness, wearing a back brace and walking.

Comment

Fractures of the thoracic region of the spine are a frequent complication in childhood tetanus. The physiological kyphosis of the thoracic part of the spine in the juvenile, the sustained muscular contraction, plus the tetanic spasms combine to produce fractures of these spongy, relatively delicate cubes of bone. The apex of the thoracic kyphosis acts as the fulcrum.

The source of the infection in this patient is not known. It could have arisen in the severely inflamed gums and tongue. The case report illustrates the value of the lateral view in the routine roentgenologic examination of the chest. It is admitted that this is a rare instance, yet without the normal appearance of the thoracic area of the spine on the earlier lateral chest film the later films of the spine might have been more difficult to evaluate.

Summary

A case of tetanus occurred in a 16-year-old boy. The source of the infection was not apparent, and the infection was complicated by compression fractures of the third through the ninth thoracic vertebrae. The patient recovered.

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COUNCIL ON FOODS AND NUTRITION

Report to the Council

The Council has authorized publication of the following report. The Council is pleased to acknowledge cosponsorship of the report by The Nutrition Foundation, Inc.

PHILIP L. WHITE, SC.D., *Secretary.*

AN ADEQUATE DIET

Leonard A. Maynard, Ph.D., Ithaca, N. Y.

An adequate diet is one which meets in full all the nutritional needs of the person. These needs are set forth for infants, children, boys, girls, men, and women in the report [1] entitled Recommended Dietary Allowances. The data in this report are based on an exhaustive review of all of the research and other information available up to the time of its publication in 1958. These data are considered to provide the basis for a fully adequate diet for all normal persons as is indicated by the following quotation:

> These allowances are designed to maintain good nutrition in healthy persons in the United States under current conditions of living and to cover nearly all variations of requirements for nutrients in the population at large. They are meant to afford a margin of sufficiency above minimal requirements and are, therefore, planned to provide a buffer against the added needs of various stresses and to make possible other potential improvements of growth and function.

In providing for the needs of all healthy persons, including those subject to various stresses, the recommended dietary allowances exceed the requirements of many persons. Thus, failure to meet them fully does not mean that a given person is thereby undernourished. On the other hand, the allowances are not designed to be adequate to meet additional requirements which may be associated with disease or needed by severely depleted persons and which may call for supplementation ac-

From the Graduate School of Nutrition, Cornell University.

cordingly. The allowances should not be confused with the generally lower minimum daily requirements established for the Food and Drug Administration for labeling purposes and considered to be the amounts needed to prevent symptoms of deficiency and to provide a small factor of safety.

There are a few nutrients known to be essential in human nutrition or presumed to be essential, on the basis of animal experiments or in vitro studies, for which definite allowances have not been established. The Food and Nutrition Board report discusses these cases and cites the data available as to quantitative requirements and as to their content in foods. From these data it appears highly probable that any needs for these nutrients can be met readily by a mixed diet that is adequate in other respects. A case in point is represented by various trace elements which are associated with enzyme systems and are thus presumably essential in minute amounts but which are widely distributed in foods of either plant or animal origin.

Nutrient allowances are useful in practice only as they are translated into diets. Fortunately, the food supply of the United States is so large and provides such rich and varied sources of the nutrients needed that it is readily possible for everyone to have an adequate diet from foods available to him. The abundance of this food supply is indicated by the fact that during recent years, the per capita, retail, edible supplies of protein, iron, vitamin A, thiamine, riboflavin, niacin, and ascorbic acid have exceeded the per capita allowances for these nutrients by 40% or more. Thus, though surveys continue to show that a substantial number of households and individual persons fail to consume diets which fully meet the recommended dietary allowances for all nutrients, it is not to be construed necessarily that needed food supplies are unavailable or that the individual persons in question are malnourished. Such surveys do indicate a widespread lack of appreciation of the importance of an adequate diet and a lack of knowledge of how to select it.

Actually, due to the great variety of the food supplies readily available, there are many ways in which an adequate diet can be obtained. A very helpful guide for food selection has been issued [2] by the United States Department of Agriculture. In this publication, foods are divided into four groups, and directions are given as to how to choose a diet from these groups.

The milk group includes cheese and ice cream which may replace part of the milk. It is suggested that children receive three or four cups of milk, teenagers four or more cups, adults two or more cups, pregnant women four or more cups, and nursing mothers six or more cups daily. The milk group is counted upon to furnish the major portion of the calcium needs. It is an important contributor of high-quality protein and riboflavin and also provides many other vitamins and minerals, as well as carbohydrates and fat to meet energy needs. To supply needed vitamin D for infants, children, adolescents, and pregnant and lactating women, milk should be the product enriched in this nutrient.

The meat group includes beef, veal, pork, lamb, poultry, fish, and eggs, with dry beans, dry peas, and nuts as alternates. Two or more servings daily from this group are recommended. These foods are of special importance for the high-quality protein furnished. They are also important sources of iron, thiamine, riboflavin, and niacin and supply other minerals and vitamins as well. Variable amounts of fat, useful for energy needs, are furnished.

The vegetable-fruit group includes a long list of foods from which four or more servings daily should be selected. It is specified that these servings should include a dark green or deep yellow vegetable at least every other day to provide vitamin A, a citrus fruit or other fruit important for vitamin C daily, and other fruits and vegetables including potatoes. In addition to their large contributions of vitamins A and C, the four servings from this group also provide significant amounts of iron, niacin, thiamine, and certain other vitamins and minerals.

Four or more servings daily from the bread-cereals group are suggested. This group includes whole grain, enriched, or restored cereals. It is important for its contribution of thiamine, niacin, and iron and also furnishes worthwhile amounts of protein and certain other minerals and vitamins, depending on the specific source. The group provides these various nutrients and also calories at a relatively low cost.

The United States Department of Agriculture publication states that the minimum number of servings suggested forms the foundation for a good diet which can be rounded out by more of the same foods or others not mentioned, such as table fats, other cereal products, and sugar, to provide the additional calories and nutrients needed. The publication gives details as to the nutritional contributions of the foods in the different groups and as to how a daily food plan can be developed to insure an adequate diet. The information is summarized in a four-page pamphlet [3] which can be obtained in quantity from the Superintendent of Documents, U. S. Government Printing Office.

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MEDICINE AT WORK

- *Meals on Wheels*
- *Discipline Committee*
- *Libraries and Aged*
- *Figuring Fees*
- *Medical Museums*

Needed: Smog Doctor

Los Angeles County is looking for an epidemiologist. The position will be under Civil Service and will pay $13,284 per year. The job—smog doctor.

Angeleños have spent years reading, through smog-irritated eyes, almost daily news stories of governmental efforts to abate the city's air pollution problem. Industrial smoke ordinances, bans against trash fires, plans for auto exhaust attachments, and dreams of importing fresher air through mountain tunnels have done little to alleviate the man-made blight that all but cancels out the area's fabled sunshine.

The physician chosen for the post recently created by the Los Angeles Board of Supervisors will serve as an aide to County Health Officer Roy O. Gilbert, M.D. He says, "The position is intended to provide the County with an official viewpoint on the medical aspects of the air pollution problem. This will involve both clinical observations and statistical studies. It will also entail investigative effort in relation to research being conducted by others in the health implications of air pollution."

Although jokes dealing with the minor irritations of smog have become a staple of West Coast TV comedians, such humor is lost on those who are acquainted with smog's sometimes deadly effects. Surgeon General Leroy Burney of the Public Health Service has warned: "Investigators are finding a definite association between community air pollution and high mortality rates due to cancer of the respiratory tract."

Bringing Words to the Aged and Infirm

Libraries Find New Ways To Serve Elderly Patrons

In Racine, Wis., a bedridden oldster continues a life-long interest in reading by means of a ceiling projector for filmed books.

In Atlanta, Ga., physicians join with employment experts and government officials to give their time to a job clinic for senior citizens.

In Milwaukee, those who read to the housebound aged are offered a guide called "Let Us Read Aloud."

Despite the geographic spread these aids for the aging have one thing in common: They all are sponsored by libraries. The projects, and a number of similar ones, were explained by Milton Cummings, Ph.D., of the U. S. Office of Education, at a Washington meeting sponsored by the A. M. A. Committee on Aging.

In White Plains, N. Y., the public library—working with volunteers banded together as Friends of the Library—sends books and records to shut-ins, whether institutionalized or at home. The Huntington library in West Virginia accepts telephone orders for mailing books to readers free of charge.

A new library building in Montclair, N. J., has installed a self-service elevator for those in wheel chairs and a music area where groups can listen to records. The Free Public Library Commission of Wisconsin distributes a booklet entitled "The Advancing Years" listing books, pamphlets, reports, and surveys which should prove helpful to those working with older people.

Another pamphlet, "Books for Tired Eyes," is now in its fifth revision. Published by the American Public Library Association, it

Immobilized patient operates push-button control of ceiling projector, which makes more than 1,000 filmed books available to bedridden persons.

lists current books of interest printed in extra-large type for the benefit of older readers.

Most of these programs are adaptable to local conditions, Dr. Cummings said. Two similar Ohio plans deliver books directly to the sick and elderly both at home and in institutions. In Cleveland, the service is performed by librarian-specialists, but in Dayton, Ohio, the work is handled by volunteers.

At least one boon to the elderly came about partly by accident. The Chicago Public Library began a series of live and recorded noon concerts for Loop workers, only to find that the city's aged are now among the most enthusiastic listeners.

The Patient Stays Home in This Rehabilitation Plan

Medical teamwork is helping many chronically ill and disabled patients—most of them aged—return to at least partial self-care in New York's northern Westchester County. Team effort involves not only the patient's physician but a District Nurse and a physical therapist—and results in a plan of rehabilitative exercise to be carried out by the nurse in the patient's home. The program is sponsored by the District Nursing Association under a grant from the New York Arthritis and Rheumatism Foundation, which also makes available the help of a specialist in physical medicine as a consultant.

Here's how the program was explained in a recent issue of the Westchester County Medical Society's *Bulletin:* All patients on the nurse's schedule are reviewed by her for rehabilitative possibilities. Where restorative procedures seem indicated, the patient's physician is consulted. The patient is then given a rehabilitation evaluation by the plan's therapist, who consults with the physiatrist when necessary.

At this point, a plan of therapeutic procedures is worked out by the family physician, the therapist, and the nurse. The treatment agreed on is begun by the therapist and the nurse. In time the nurse is able to offer most treatment procedures, with the therapist dropping in occasionally to check on her progress. Once a month both nurse and therapist meet to discuss the patient's progress with a Health Department nutritionist and any social workers involved.

Rehabilitative services have been provided to more than 110 patients since the program was begun in 1956. Their median age was 64.5 years. Most suffered from stroke, degenerative diseases of the nervous system, arthritis, or hip fracture. Some of the rehabilitative procedures employed have been therapeutic exercise, heat application, moving from bed to chair, crutch walking, and the use of walkers.

Although few of the patients have been helped to the point of independence, nearly 70% show improvement, indicating that the restoration of even limited self-care is worth the effort expended.

Sometimes the little human attentions are as important to the "meals" recipient as the food the volunteers bring.

How Meals on Wheels Help the Shut-in

Tomorrow afternoon and every afternoon a station wagon will stop before a tenement building in Columbus, Ohio. Its driver will deliver one complete hot meal and enough cold food for two more to a shut-in incapable of providing adequate meals for himself. At almost the same time similar events will be taking place in Rochester, N. Y.; Philadelphia; and East Orange, N. J. These services are known as "Meals on Wheels."

Although they are similar in operation, the services have a wide variety of sponsors. In Columbus the service is operated by housewives led by a determined clubwoman. In Rochester and Monroe County it is being supervised by the Visiting Nurse Service and subsidized by the state health department. Philadelphia's "meals" program is operated by a settlement known as the Lighthouse, and in East Orange, the project is under the wing of 10 civic clubs.

It was in Philadelphia—spurred by the success of England's World War II plans to feed its bombed-out citizens—that "Meals on Wheels" had its American beginnings. Visiting nurses in the city's Kensington section pointed out to its Welfare Council that health breakdowns and hospital admissions resulting from grossly inadequate diets might be prevented by a plan that would offer adequate

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nutrition for those unable to provide it for themselves. The Council asked the Lighthouse to find an answer. The solution was "Meals on Wheels."

The Pattern Is the Same

Despite local variations all U. S. "meals" plans are essentially the same. Carefully planned hot meals are prepared in a central kitchen and delivered in warm containers. Accompanying the hot plate are sandwiches, cereals, fruits, and beverages to provide for much of the customer's caloric requirements for the rest of the 24 hours.

And customers they are, too. No client receives his meals free, although daily prices range from 30 cents to $2. Most plans provide a sliding scale of charges based on ability to pay. Deficits in operational budgets are covered in a variety of ways—foundation awards, service club donations, Community Chest appropriations, and fund-raising projects. Rochester's program will be subsidized through 1961 by the state health department as a demonstration project. In Columbus, "wheel" clubs meet monthly for card parties and donate their dues to the program.

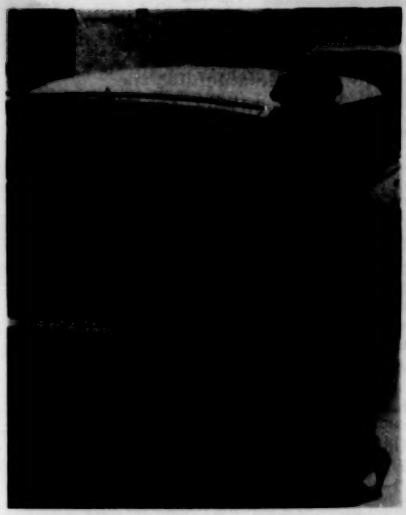
Physicians participate in some way in most of the plans. In many instances they are a source of referrals for the service. At least one service checks with its clients' physicians for special dietary orders. In Philadelphia Dr. Stanley Tauber acts as medical adviser to the Lighthouse project, which was given the 1956 Benjamin Rush award by the Philadelphia County Medical Society for its outstanding contribution to public health.

Three of the "meals" programs prepare their own food, hiring part-time kitchen help for the task. In Columbus arrangements have been made with two of the city's restaurants for hot food preparation. Many schemes have been tried for keeping food warm and palatable during delivery. Philadelphia volunteers put covered plates in reusable insulated bags which close with a metal clip. In Columbus meals are carried in a heated oven similar to that used by airlines.

Women and Teen-agers

Although some paid labor is used by each "meals" plan—usually cooks and kitchen help—reliance on volunteers is almost axiomatic. Not only do these unpaid workers keep costs down but they also furnish the friendly human contact that may be almost as helpful to the shut-ins as the food they bring.

In Columbus women members of "Meals on Wheels" substitute for the paid driver on week ends, allowing uninterrupted service through the week. In Rochester volunteers do almost all the work, from packaging meals to making deliveries. Two women are assigned to each car, one to drive and the other to make the actual delivery.



Airline-type carrier keeps food warm from kitchen to recipient in Columbus, Ohio.

In Philadelphia the Lighthouse program relies heavily on volunteers and has even attracted adolescent help. Teen-agers accompany staff drivers on their rounds and provide a measure of youthful company for "meals" recipients who would otherwise have little contact with the world outside.

All clients of these services have one thing in common: they would find it extremely difficult, if not impossible, to feed themselves adequately without the help of "Meals on Wheels." Most are elderly, handicapped by physical disability, and without family or friends to help.

Many newcomers joining the "meals" programs have been on a "tea and toast" diet for lengthy periods. "This is the first real food I've had in many a year," said one, and for the first few weeks of service, many complain of "too much food." Miss Izola Williams, Columbus nutritionist, says, "It appears they are unaccustomed to a full diet, or it is their custom to cut corners on food." The Columbus unit has found that if it can prevail on recipients to take food daily for three weeks, they will then maintain the schedule without urging.

One "meals" client—blind herself, and with a handicapped husband—was moved to write of her appreciation of the service, "We have been getting these meals for two weeks now, because of my husband's illness and my own handicap. It's wonderful not to have to eat burnt foods any more."

A.M.A. Disciplinary Committee

Toward "Heightening the Proper Practice of Medicine"

Are medical society grievance committees dealing adequately with the profession's tiny minority of errant practitioners? What is the number of this "tiny minority"? How might physicians better serve medicine's highest principles as well as the public by cracking down on the few "bad egg doctors" who are incompetent to the point of criminal negligence, who overcharge to the point of community revulsion, who evade their tax responsibilities to the point of court censure, or who run their practice while at the point of insanity or under drug addiction?

These and other gnawing questions came up for frank discussion last month in Salt Lake City at the first meeting of the new A. M. A. Medical Disciplinary Committee, which was created by the Board of Trustees during the Clinical Meeting in December. That session on April 16 represents the latest phase in a growing recognition by physicians that they must be their brothers' keepers in order to keep their art pure and holy. (See Medicine at Work, THE JOURNAL, April 5, 1958.)

In opening the conference, Dr. Raymond M. McKeown, a member of the Board of Trustees who serves as Committee Chairman, said: "The A. M. A. has become increasingly aware that someway, somehow, medicine should have something to say about the behavior of its practitioners. Those of us who have tried to bring about changes among the 3 to 5% of colleagues who are disreputable frequently lost out." Following are comments from other committee members:

"The 3 to 5% too often force us to live with their poor behavior, instead of we guiding them."

"We should launch our study on a more realistic approach to the fee situation, particularly as it relates to surgery."

"The fact that well over 90% of this nation's physicians are suffering from the antics of the other few per cent makes our mission strong."

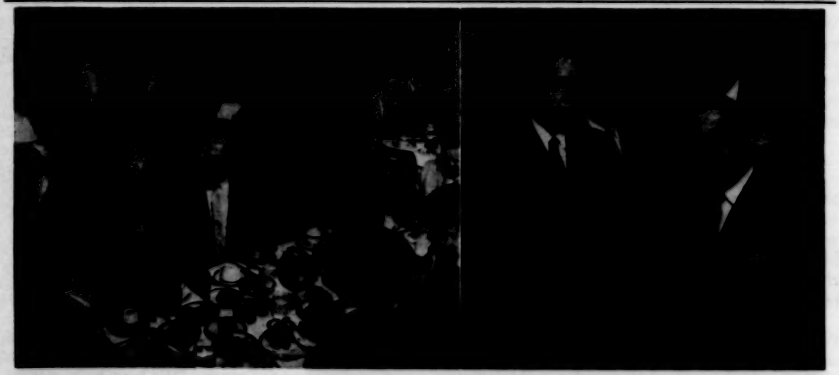
"I consider physician overcharging of insurance companies the first goal for Committee study."

"Let's start gathering figures on what state medical license boards are doing to physicians convicted of unlawful acts."

"Many grievance committees are valuable for public relations but are not doing the job that needs to be done. Some are toothless watchdogs that bark but don't bite."

While calling for tighter control over the fringe of incompetent or dishonest physicians, the Committee as a whole by no means expressed any intent to undermine the profession's institution of grievance panels, 1,100 of which have been functioning in the United States since 1871—most effectively in the past decade, thanks to the diligence of more than 5,000 members both in and out of medicine.

One member of the new Medical Disciplinary Committee is Dr. James H. Berge of Seattle, who once headed his state society's grievance committee and is a founder and now chairman of Washington State's three-year-old Medical Disciplinary Board. The only body of its kind, this unit of state govern-



Physicians and attorneys chat informally (*left*) at luncheon between sessions of medicolegal conference in Salt Lake City, April 18. In front (*right*) are Gen. Frank Ritter, representing American Bar Association, and Dr. U. R. Bryner (holding briefcase), president of Utah State Medical Association. Behind them are Dr. George M. Fister, member of A. M. A. Board of Trustees, and Ira A. Huggins, president of Bar Association of Utah. A. M. A. Law Division is scheduling another such regional series in 1961 (see Medicine at Work, THE JOURNAL, April 25, 1959).

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Quotes on Conduct . . .

The whole profession should not be tarred with the same stick which should be applied to the few.

—Dr. Edward J. McCormick, on becoming A. M. A. President in 1953.

While it is never pleasant to find a colleague guilty and impose punishment, this is a responsibility falling on some of us.

—A. M. A. Judicial Council

Professionally, we doctors resemble dictators in alternating between complete disregard of criticism and exquisite sensitiveness to it.

—Alan Gregg, M.D., pioneer medical educator

If we individual physicians do not keep medicine's house in order, outside organizations—like hospitals or government—will do it for us . . . Our first responsibility is to our patients, and not to ourselves or our system of medicine.

—Dr. David B. Allman, Past-President of the A. M. A.

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ment comprises a panel of physicians (elected by physicians) with power to censure, suspend medical license, or order outright revocation. Their rulings have been upheld in five revocation decisions taken to the state Supreme Court. "All of our actions," says Dr. Berge, "have been based on sound legal advice—not only from the board's counsel but from the state bar as well."

Cases cited by Dr. Berge at the Salt Lake City meeting last month covered unethical conduct involving nontherapeutic abortion, alcohol and narcotics addiction, income tax evasion, gross overcharging, and fraudulent billing to medical insurance companies. Penalties ranged from rebuke to revocation of license.

When the new A. M. A. Committee meets again in a few weeks, it is expected to draw up specific purposes and objectives, based on studies of the Washington board, various state medical practice laws, and related experience elsewhere in the United States. Dr. McKeown emphasized the Committee's basic motive when he told his colleagues: "We are here to find some acceptable method of heightening the proper practice of medicine without regimenting the profession."

Members of the A. M. A. Medical Disciplinary Committee are Drs. H. Thomas McGuire of New Castle, Del.; Paul G. Henley of El Dorado, Ark.; James H. Berge of Seattle; E. G. Shelley of North East, Pa.; and Raymond M. McKeown of Coos Bay, Ore., Chairman. Staff Secretary is Mr. C. Joseph Stetler of Chicago.

What Eight States Are Doing About Relative Value Studies

"We use our relative value study as a tool; we negotiate with it, and we'd have been in bad shape without it."

The speaker is Dr. John Rumsey of San Diego, Calif. The occasion is a Western-states regional meeting. His audience includes medical association officials from eight states west of the Rockies and a scattering of Midwesterners.

The group gathered in San Francisco last month at the request of the A. M. A. Committee on Medical Practices to talk about relative value studies and to review materials offered by the Committee to help state associations desiring to make such studies of their own (see Medicine at Work, THE JOURNAL, March 21, 1959.)

Dr. Rumsey was referring to the relative value study pioneered by the California Medical Association in 1956 after three years of work and the expenditure of about $50,000. He said, "We have used it in negotiations with Medicare, the unions, and in the county medical societies for grievance committee decisions."

Most of the state medical association representatives not only expressed an interest in pursuing relative value studies of their own, but in many cases had already begun the work and are borrowing heavily from California's experience and examples. Here is a round-up:

—Dr. William J. Reals of Wichita, Kan., reported that he and his Committee on Fees had spent 14 months preparing a relative value schedule for the Kansas Medical Society. He said, "The American public is committed to the budget system of paying its bills, and the public wants to budget its health expenditures too. Relative value studies have become a necessity."

—Dr. John DeTar of Milan, Mich., a member of the Committee on Medical Practices, said that the Michigan State Medical Society accepted the California study verbatim when it found itself needing one badly for negotiating purposes. He said: "We plan to follow up this action with a state-wide study of our own."

Arizona Yes—Colorado No

—In Arizona, according to Dr. Francis M. Findley of San Manuel, interest in a relative value study is high and the state association will probably make use of the California format. In the neighboring state of New Mexico interest in such studies is just beginning. Dr. John Corcoran of Albuquerque said a recently appointed committee expected work on the study to begin almost immediately.

—Colorado, on the other hand, has no plans for a relative value study, according to Dr. Cyrus Anderson. "Our physicians are opposed to a state fee

Theory of Relativity

Relative values is a rather high-sounding name for a simple concept:

—Values are unit designations assigned to medical procedures performed by the physician.

—Relativity is achieved by weighing each procedure according to the time, competence, effort, and experience required to perform it, as reflected by the physicians' customary charges.

For example, California's relative value study uses a unit value of 1 for a routine office visit, 2 for the first home visit, 10 for the first week of hospital care for a premature infant, and 20 for routine care of a well baby for one year (see Medicine at Work, THE JOURNAL, March 21, 1959).

schedule of any kind," he said. "We think we have a better arrangement in our flexible service plan which can be adjusted to a variety of income levels."

—Dr. James Buckley of Portland, Ore., said his state society's Prepayment Committee is working toward a revision of the Oregon Physicians' Service schedules, to be determined through a survey similar to that made in California.

—Dr. E. L. Calhoun of Aberdeen told the group that there is little interest in his state of Washington in the creation of a relative value study. He added, however, that the Committee's study is used in Washington as a check against fees.

—Nevada's 300 physicians will probably be surveyed soon. Dr. Arthur E. Scott of Reno said his state society's insurance committee had done some work in this field but is planning a more comprehensive job.

—Dr. Homer Smith of Salt Lake City said the Utah Medical Association already has a state fee schedule but that there is current interest in doing a relative value study as well.

Study Aids Available

Five A. M. A. publications developed to aid states planning relative value studies were displayed at the meeting. Included are a statement on the background and need for such studies (Relative Value Publication No. 1), a listing of code numbers and nomenclature based on the California model (RVP No. 2), a suggested format for the conduct of such a study (RVP No. 3), a check list of things to be done to make a study successful (RVP No. 4), and a series of questions and answers about such studies (RVP No. 5). Representatives of most states expressed the hope that the A. M. A. might be able to make the materials available in quantity for use in proposed studies.

Mr. Charles Williams of New York, representing the Health Insurance Council, said, "We are encouraged by California's development of a uniform nomenclature, and we are tending to use it as a replacement for our own. Many of our benefit schedules are out of date, and pay disproportionate amounts for services. Relative value studies will do a great deal for insurance companies."

Dr. Lester Bibler, chairman of the Committee on Medical Practices, told the group that theirs was the first in a series of informational meetings to be held on a regional basis. The second is being scheduled for the New England states on July 18 and 19.

A. M. A. Committee on Medical Practices meets in San Francisco prior to last month's regional meeting on relative value studies.

Dr. Reals of Kansas may have summed up the feelings of many physicians when he said, "If we don't make relative value studies of our own, someone else will. It may be done by our friends—but it might also be done by the government."

Medical Methuselahs—and Babies

One way to avoid the pitfalls that sometimes accompany retirement is to keep on working.

Though they don't specifically credit their happy longevity to their continuing practices, four Morganfield, Ky., physicians are nevertheless still at work. Each has passed the age of 85.

Reporting a recent interview with the four—Drs. H. B. Stewart, C. B. Graves, H. B. Allen, and J. W. Conway—the Evansville (Ind.) *Press* says none has any plans for retirement, although all have whittled down their working schedules.

Practicing for a total of 223 years leads to the accumulation of some pretty impressive statistics. One is that the four physicians have delivered just about as many babies as there are persons now living in the county—1,500.

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The Law and the Laboratory —A Time to Remodel

In 39 states you can will your car to a friend, your real estate to your college, or your fortune to a pet canary, but you cannot bequeath your cornea to an eye bank or your body to a medical school. "In an era when physical science knows no limits," says Dr. Lester R. Dragstedt, "biology and medical advances are thwarted by jerry-built laws which were mainly enacted before the new medical possibilities appeared."

Dr. Dragstedt is president of the National Society for Medical Research (NSMR), which is cosponsoring the first National Conference on the Legal Environment of Medical Science. The meeting will be held on May 27 and 28 on the campus of the University of Chicago, its other sponsor. Scientists, legal scholars, and religious leaders are expected to attend.

Not only does the law make difficult the procuring of cadavers and other materials for use in research in anatomy, pathology, and organ transplantation but it remains cloudy in regard to the legal rights of and responsibilities toward human beings serving in trials of new medical treatments.

Next week's conference is an outgrowth of an NSMR committee established originally to investigate shortages of cadavers for anatomic studies. Those attending will be aiming at greater feats, however, and will attempt to reach agreement on ethical standards for the experimental use of human volunteers, cadavers, and laboratory animals. In addition, the conferees will seek to develop principles for a model legal code to govern research in medicine.

Participants will include representatives of groups affected by the differing practices, decisions, and laws affecting research which, says Dr. Dragstedt, "like Topsy—have just growed."

Award for "MD International"

A television documentary film portraying physicians abroad as medical ambassadors of good will has won the broadcasting industry's top honor.

The George Foster Peabody award went last month to "MD International," which was presented over NBC in 1958 by Smith Kline & French Laboratories in cooperation with the A. M. A. The production crew recorded activities of American physicians in private, missionary, military, foundation, and government practice. Countries visited included Japan, Korea, China, India, Indonesia, Iran, Turkey, Ethiopia, France, and Guatemala. (See Medicine at Work, THE JOURNAL, Sept. 7, 1958.)

Typical of these practitioners was Dr. Albert C. Holt, who said in Bombay, "We are representing the whole medical profession in America to these people. If we fail, American medicine fails in their eyes." A. M. A. President Gunnar Gundersen expressed it this way: "World peace cannot be attained until we build peace into the hearts and minds of men. We can add new meaning to the M.D. degree—Medical Diplomacy."

Some Wit and Philosophy at a Medical Meeting

Who says that all medical presentations are humorless drones of statistics, platitudes, and trivia? Below are some sample comments from two physicians who took part in a panel discussion at the American College of Physicians meeting in Chicago a month ago. A new feature of the five-day session was that business, civic, and nonmedical professional leaders were invited.

Dr. Irvine H. Page of Cleveland:

I am often asked, "Are we getting anywhere in research on heart disease?" It's like asking, "Are you getting anywhere with women?" It all depends on what you have in mind. In terms of dollars you have already gotten far more than you should have expected, but no horse can go as fast as the money you bet on it.

Femaleness seems to be much more than sex, as many of the richer males are finding out. Femaleness seems to assure that women, less likely to develop arteriosclerosis, will inherit this earth at least.

People will not give up something for nothing. When they were told not to smoke the consumption of tobacco went up about 6%. You know what happened when Mr. Volstead told them not to drink, and I haven't noticed a reduction in the birth rate.

Dr. Henry L. Bockus of Philadelphia:

The wise man does not accept retirement. He is not disturbed by it, for his life is, if anything, richer and happier than before. Actually he has not retired; he does not talk or think retirement.

No one can actually retire the person who won't withdraw. This person will continue to learn, and, above all, to render service to others, to the community, to his profession and country.

When does a philosopher become old? What is the age of wisdom? Someone has said that early indications of aging may simply be (1) when reading the newspaper, you turn to the obituaries before the sports page; (2) in the restaurant, you look at the menu before you look at the waitress; (3) in the station, you wait for the crowded escalator instead of using the empty stairs; and (4) your party is spoiled because you keep thinking how awful you will feel the next morning.

More Than Money

The reluctance of some older people to consult physicians concerning their health problems may not be a simple matter of economics.

Although about 85% of the persons in the over-65 age group cited in a recent survey said they had had some health complaint within the previous four weeks, only one in three had seen a physician. But among the two-thirds who did not call a doctor, only 3% said they delayed because of cost.

The survey was sponsored by the Health Information Foundation. George Bugby, HIF president, hazarded a guess on another possible reason for the failure to seek medical attention. He said, "Perhaps there is a feeling on the part of many older people that visiting a doctor or a hospital is tantamount to acknowledging an inability to cope with the inevitable illnesses of old age."

Some "Firsts" and "Specials" At the Atlantic City Meeting

What will be "different" about the A. M. A. scientific program next month? Quite a few things. When the 108th annual meeting opens for an estimated 15,000 physicians and 18,000 other persons there will be a number of new cooperative efforts, covering advances both in and out of medicine. The nonmedical fields include engineering, athletics, art, military affairs, and space technology. Even within the profession 14 other medical organizations will assemble for their own meetings around the time of the A. M. A. session, June 8 through 12.

Following are some of the "firsts" and "specials" of the scientific program:

—Seven sections will hold a joint symposium on June 11 in Convention Hall on progress in the management of childbirth. Six will meet together on June 10 to discuss hepatic diseases. Never before have more than two or three sections co-sponsored an A. M. A. symposium.

—For the first time there will be full-dress symposiums on hypnosis (June 11) and on medical problems in the jet and space age (June 9). In the recent past these subjects have been presented only in individual papers.

Other outstanding symposiums include one on blood diseases June 8, on viruses June 9, on aging June 10, and on cutaneous facial disfigurement (to be discussed more thoroughly than at any previous A. M. A. meeting) June 9. To top it off, 7 of the 21 sections of the scientific assembly this year are marking their 100th anniversaries—making next month's meeting even more "special."

(Details of the entire scientific program were published in the April 18, 1959, issue of THE JOURNAL.)

Look Again, Doctor

Museums Specialize Too—For Physicians and the Public

Richard P. Pratt

The list of modern means used to offer postgraduate medical education reads like a roll call of electronics—color television, two-way FM radio, motion pictures, tape and disk recordings, and transatlantic telephone hook-ups. Exposed almost daily to these technological advances, a hard-working doctor may easily overlook one method which has survived the test of centuries—the medical museum.

No man can clearly identify its origins, but the museum has been around for a long, long time. Alexandria was founded in 330 B. C. to extend Greek culture, and one of its early public buildings housed a museum containing laboratories, dissection chambers, botanical and zoological gardens, and living quarters for philosophers.

Today's medical museums may lack the breadth of Alexandria's, but they more than make up for this in depth. Tools for professional study and research are available—often close at hand—for the physician. And for the layman bent on adding to his knowledge of health, public museums offer many opportunities.

For the public, the outlook gets brighter all the time. Rapidly disappearing are the uninspired collections of specimens, models, and artifacts formidably enclosed in poorly lighted cases. In their place are being created highly entertaining, yet still instructive, exhibits which make effective use of modern materials and techniques to present anatomic and health information in dynamic forms.

For the physician the way is not so well prepared, but the inquiring mind will discover several notable collections that help to place medicine in historic perspective and provide a wealth of material for study and research.

An outstanding museum—and one quite different from most of its contemporaries—is the Hall of Fame and its accompanying School of History of Surgery and Related Sciences in Chicago. Housed in an impressive structure facing Lake Michigan, it was conceived by Dr. Max Thorek and is sponsored by the International College of Surgeons which he founded.

Skulls and Sculpture

Here the radiologist will find an operable x-ray machine more than half a century old, and the brain surgeon may view the perforated skulls of ancient Peruvians that show evidence of cranial

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surgery (trephination). Rare indeed is the physician whose understanding of his profession will not be enhanced by viewing the original model of the Carrel-Lindbergh artificial heart, reports in the handwriting of Freud, Pasteur, and Curie, and the surgical instrumentation of the ages.

Imhotep, the Egyptian physician who was elevated to full godhood, is memorialized in life-size sculpture in the Hall of Immortals as are such others as Hippocrates, Galen, Paré, Harvey, Morgagni, Semmelweis, and Lister. In the Hall of Murals, landmarks in the development of surgery have been executed in oils by Count Gregorio Calvi di Bergolo. Added to these are the historical displays of some two dozen of the world's free nations which have furnished rooms with materials illustrating the medical efforts of their physicians and national contributions to the arts of medicine and surgery.

Not content with its great but passive display of the wonders of the past, the School of History and Related Sciences periodically opens the building's main floor to audiences invited to hear prominent surgeons and educators discuss medicine's past, both recent and ancient.

In Washington

As might be expected, the nation's capital is the site of at least two collections valuable to the physician bent on education—either general or specific. The museum section of the Armed Forces Institute of Pathology will celebrate its centennial in 1962. Founded soon after Virchow's publication of the revolutionary concept of cellular pathology, it was formed originally as a repository for pathological specimens used in the training of Army surgeons. Its materials are now divided into public and professional collections. A wide range of mounted pathological specimens and gross tissue is available for professional study. The museum's collection of 500 microscopes is without equal in the U. S. and traces the instrument's evolution from crude origin to present electronic form. In addition, the museum has a selection of surgical and diagnostic instruments and even postage stamps of medical interest.

Ether to X-ray

Washington's venerable Smithsonian, storehouse for many national treasures, is another repository with great appeal for the physician. Although its collections are presented primarily for lay understanding, exhibits of professional value include a Peruvian skull still bearing the Western Hemisphere's oldest example of a surgical dressing, the patent office model of the W. T. G. Morton ether inhaler, and x-ray tubes used by Roentgen and Emil Grubbe.

Most of the Smithsonian's medical and pharmaceutical items are not isolated display objects but are parts of exhibits showing the evolutionary course of the subject. The museum includes col-

History of medicine through artistic eyes. These scenes are from Hall of Fame in Chicago. Paintings, *left* to *right*, depict honoring of Lister and Pasteur, early amputation, and trephination in prehistoric Peru.

lections of medical, dental, and pharmaceutical instruments; electrocardiographs dating from Dr. Frank Wilson's earliest efforts; a display of hearing aids "from cupped hand to transistor"; and such sidelight items as an early nursing bottle shaped like a woman's breast and made of glass.

Philadelphia

In Philadelphia, the Mütter Museum of the College of Physicians has attracted both medical students and physicians. The Mütter's educational appeal is chiefly historical. It was built around the pathology collection of Dr. Thomas Mütter, whose wet specimens were given to the museum in 1863. However, its displays also include a collection of skulls—some showing ancient trephination techniques used in Peru—, dislocated and fractured bones in various stages of repair, a display of clinical thermometers, 16th century surgical instruments, and a series on the evolution of the hypodermic syringe.

The Cambridge Contribution

The Warren Anatomical Museum in Cambridge, Mass., an adjunct of Harvard University, serves as a teaching collection for the Harvard Medical School, but its curator, Dr. Paul I. Yakovlev, hopes to see it become "a memorial of medical history at Harvard." In addition to its collection of normal and pathological bones and organs of man and animals, it also owns medical curios of historic interest for physicians.

Among these are the Crowbar Skull and the phrenological collection. The Crowbar Skull is that of Phineas Gage, foreman of a rock blasting gang, who accidentally fired a powder charge which drove a 13-lb. tamping iron into his cheek and out through the top of the cranium. The survival of the victim of this 1848 accident was a cause for wonderment for almost a century until the advent of frontal brain surgery in the late 1930's.

It was in this same era that phrenology enjoyed its vogue. The Warren Museum's collection of head casts was inherited from the Boston Phrenological Society after that group's interest waned in 1842. The unusual collection is comparable only to one in Paris.

Exhibit of Armed Forces Institute of Pathology in Washington, D. C.

Mayo Foundation

As one of its many activities in Rochester, Minn., the Mayo Foundation operates a divided museum. One part serves to educate the public in matters of health; the other is a study and research collection open only to physicians, nurses, and dentists.

The professional exhibits are housed on a separate floor of the foundation's museum building and in the various hospitals. In addition to displays of medical and surgical instruments, models, photographs, and charts, the museum boasts more than 750,000 surgical and pathological specimens which are not exhibited but are available for study and research.

Education for the Public

Health museums for laymen got their start in early 20th century attempts to bridge the gap between lay and professional knowledge in Europe and Great Britain. In fact, German experts in health exhibit techniques were lured to the U. S. in the 1930's to aid in the preparation of the medical attractions which were popular at the great fairs held during that period in a number of the nation's major cities.

From these beginnings sprang the popular health museums that have emerged or are being considered in many U. S. cities. Cleveland's Health Museum was opened in 1940 with the blessing of the Academy of Medicine. In 1946, the Dallas Academy of Medicine—whose membership includes dentists, pharmacists, and hospital officials as well as physicians—sparked a drive that culminated in the Dallas Health Museum, which is maintained almost entirely by public subscription. The first

Second Life for Exhibits

Ever wonder what happens to exhibits shown at the A. M. A. Annual and Clinical meetings? Many pass into oblivion, but some graduate to the collections maintained by medical and health museums.

Refurbished and translated for nonprofessional audiences, several have been integrated into the lay collection of the Mayo Museum in Rochester, Minn. Many more are on display in the medical sections of the same museum.

One of the most popular of the technical exhibits from the 1958 meeting in San Francisco—Upjohn's giant-size model of a cell—is now on display for the hundreds of Chicagoans who visit the Museum of Science and Industry each day.

hospital to plan for and integrate a museum into its building plans was Lankenau in Philadelphia, opened to the public in 1953. Most recent addition to the museum ranks is the Kettering Foundation–sponsored Hinsdale Health Museum in Illinois, which was built in conjunction with a professional building.

Such single-purpose museums were pre-dated by a variety of health collections which were parts of general museums. These included the American Museum of Natural History in New York, the Museum of Science and Industry in Chicago, the Nebraska State Museum in Lincoln, and others in Buffalo and Toledo.

Dr. Bruno Gebhard, the pioneering curator of the Cleveland Health Museum, set the tone for the modern approach to such displays when he called them "museums, not mausoleums," a keynote that consigned poorly lighted, dust-gathering collections to oblivion and forecast the era of dynamic presentation using new methods and materials.

Models of mouths large enough to put your head into, life-size plastic body forms equipped with lighted organs and circulatory systems, tape recorded heartbeats, electrified models of the brain showing its functions, and bas-reliefs illustrating gestation from cell to child—these are the exhibits that well satisfy lay curiosity in matters of health, physiology, and bodily function and painlessly instruct in matters of natural law.

Looking Ahead

A small band of determined physicians has formed the Chicago Museum of Medical Science. As yet nothing more than a name, it was inspired by the late Dr. David J. Davis who, in 1929, wrote: "In Chicago, there should be a great medical and health museum planned in broad lines and covering every phase of historical medicine. . . . Here should be depicted the natural history of disease in all its phases, together with the efforts of man, successful and unsuccessful, to combat its ravages. . . . A medical museum properly organized, might serve the people in a medical way quite like the Art Institute serves them from the standpoint of art."

Proponents of the museum formed a nonprofit corporation in 1950 and won approval in principle from the Trustees of the American Medical Association. As described by Dr. Frederick Stenn, secretary of the group, the proposed museum would be "a treasury into and from which materials flow and are made available for loan anywhere in the country . . . a potent, vivacious, magnetic institution devoted not alone to collection and preservation, but to research and study . . . embodying the entire culture of medicine from its earliest days and pertaining to [its] every aspect."

Such a "medical visual aid institute," as it has been described by one of its backers, would search out treasures from "garret and cellar, the pawnshop, private collections, and refuse heaps." It would preserve and loan the best exhibits from medical meetings. "Every visual aid will be emphasized," says Dr. Stenn, "together with books, graphs, charts, EKG's, encephalograms, kinematograms, slides, anatomic and pathologic specimens, x-ray films, drawings, maps, photos, autographs, transparencies, models, dioramas, panoramas, statuary, coins, stamps, phonograph records, living demonstrations, models of the tonsil, larynx, esophagus, stomach, rectum, bronchus, and ear—both normal and pathologic—all seen through instruments specifically designed for their exhibition."

Aspirations such as these go hand in hand with medical progress. When man emerged from the self-imposed cultural exile of the Dark Ages, his search for knowledge resulted in "curiosity collections" of objects that intrigued but often mystified him. As he advanced—spurred by the often clandestine dissections and autopsies of the 16th century—his interest turned to anatomy and bodily function. These studies provided pathological specimens, and in the 18th century the famous Hunterian collections laid the groundwork for the modern medical museum.

And the medical museum, according to Sir Arthur Keith, former curator of the museum of the Royal College of Surgeons, is "an engine for the dissemination of culture."

More Museums on the Way

The continuing public interest in health and medical history is being matched by the desire of organized medicine to help provide facilities to meet the demand.

Three decades of planning are expected to culminate next year in the opening of the Medical Museum of Wisconsin on the site of 19th century Fort Crawford at Prairie du Chien. It was here that Dr. William Beaumont performed his notable studies in digestion. Public contributions to the project will be accepted after the profession has had an opportunity to donate.

Sponsored by the State Medical Society of Wisconsin, the effort will include a restoration of the fort's military hospital and the construction of a museum building, curator's residence and workshop, and a pavilion. The *Wisconsin Medical Journal* reports plans to "discard the 'antique shop' approach, and create a series of living, changing exhibits involving dioramas, motion pictures, and periodically changing displays of an educational nature."

In Boston, meanwhile, construction of the central building of the projected $9,500,000 Museum of Science is now under way. The second of its seven floors will house the "Hall of Man, Medicine, and Public Health." The Medical Advisory Committee of the museum says the hall will promote public understanding of the structure and function of the human body, cite developments in the diagnosis and treatment of disease, and show in perspective the culture of man as his abilities have developed.

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THYROID NODULES AND THE FALLACY OF "ALL OR NONE" TEACHING

GUEST EDITORIAL

George Crile Jr., M.D.

ELSEWHERE in this issue of THE JOURNAL, page 405, is presented a reasonable plan of treatment for asymptomatic thyroid nodules. The line of thought therein contrasts sharply with the opinions of some who believe (and can prove by statistics) that nodules in the thyroid are of no consequence. It contrasts also with the opinions of others who believe (and can prove by statistics) that all thyroid nodules should be removed. The author of the plan believes (and can prove by statistics) that some thyroid nodules should be removed and that others should not.

The confusion of opinions and statistics in medical teaching is not limited to nodules of the thyroid. The treatments for gallstones, gastric ulcers, and polyps of the colon also have been subjected to the "all-or-none" principle. Yet to these and to many other problems there may be reasonable clinical and statistical approaches.

Although it is not known whether gallstones cause cancer of the gallbladder or are caused by cancers of the gallbladder, it often is said that in order to prevent the development of cancer all gallstones should be removed. In patients with the type of cancer of the stomach that clinically, radiologically, and cytologically resembles a benign ulcer, it is not known whether or not a month of medical treatment reduces the chances of surgical cure, yet some advise immediate resection of all gastric ulcers because of the possible presence of cancer. Despite our ignorance of the natural history of these and other diseases, some physicians boldly urge their patients to undergo major operations for the removal of lesions that either are causing no symptoms or could be treated successfully by medical means.

The opposite extreme in teaching may be equally ill-advised. When patients who are good surgical risks have both gallstones and persistent abdominal distress, it seems unreasonable not to advise them to have the gallbladder removed. When gastric ulcers recur or do not heal completely it seems unwise to persist in medical treatment. If a patient who is a good surgical risk has a definite polyp of the colon, it seems inconsiderate to subject him to the anxiety of repeated examinations when the polyp could be removed so simply. Between these extremes the best solution must lie. The appropriateness of this middle course is nowhere more apparent than in the treatment of the thyroid nodule.

It is difficult to believe that those who urge the removal of all thyroid nodules really believe that this course should be followed as a mass-production, public-health principle. Clinically, nearly 5% of all adults have palpable nodules in their thyroids. Pathologically, almost all persons beyond middle age have nodules. The surgeons who say that all thyroid nodules should be removed mean that most of the patients who are referred to them have the type of nodules that should be removed. They sometimes forget that they are asked to examine patients with nodules of only such a special nature that they are thought to be of clinical significance.

Although the feeding of desiccated thyroid does not often cause nodular goiters to disappear or to shrink significantly, it does stop most goiters from growing larger. It is cheap and easy to take. Doses of 1 or 2 grains (60 or 120 mg.) daily usually stop the growth of goiters and cause no side-effects. If instead of treating multinodular goiters with desiccated thyroid a total thyroidectomy is performed, the patient still must take thyroid for the balance of his life. Also, if subtotal thyroidectomy is performed the patient should take thyroid permanently if he is to avoid recurrence.

In laboratory animals, administration of thyroid hormone protects against all types of experimentally induced cancer of the thyroid. In man, many cancers of the thyroid have been shown to shrink or to disappear when desiccated thyroid is given. Both laboratory and clinical evidence suggest that feeding of desiccated thyroid affords as much protection against the development of cancer of the thyroid as does any operation short of total thyroidectomy.

An experienced observer who has followed nodules of the thyroid from the operating room through the pathology laboratory usually can suspect the presence of cancer in a thyroid nodule. A young patient with a hard area of infiltration in a

From the Department of General Surgery, The Cleveland Clinic Foundation, and The Frank E. Bunts Educational Institute, Cleveland.

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lobe of the thyroid, a patient with a nodule and enlarged cervical lymph nodes, or an old patient with a hard, rapidly enlarging, infiltrating tumor should be suspected of having cancer. Soft, multinodular goiters, on the other hand, rarely are malignant.

It is dramatic to teach by generalization—to say that all thyroid nodules, all gastric ulcers, and all gallstones should be removed. Students enjoy this type of teaching; it is easy to learn. Clinical judgment, on the contrary, is hard to learn.

A physician is fortunate if in a lifetime he can study enough patients with one type of disease to attain a high order of judgment in this disease. That is why specialists are needed. The primary role of the surgical specialist in thyroid disease should not be to remove nodules, but to decide whether or not they need to be removed. The primary role of the internist specializing in thyroid disease should not be to treat thyroid nodules medically, but to decide which nodules should be treated medically and which should be removed. In decisions of this type, the judgment of well-trained surgeons and well-trained internists should be the same. Both surgeons and internists should be biologists at heart.

VENTRICULAR FIBRILLATION IN HEARTS TOO GOOD TO DIE

So much has been learned about ventricular fibrillation in recent years that in the future it may be possible to reduce its incidence. However, ventricular fibrillation is still a mystery in that it has no anatomic identity. It leaves no trace when it kills. It confuses the medical intellect by killing when it should not, when anatomic disease is mild and when life appears to be safe. It stops a good heart as readily as it does a damaged heart, in infants as well as in adults. It has no respect for sex or age. It kills with or without warning.

Nevertheless, positive gains have been made to prevent death and to restore life after ventricular fibrillation has occurred. One of the first encouraging signs came in 1899 from Prévost and Battelli, French physiologists, who described a method for the defibrillation of the heart of a cat in which a large electrode was placed on each side of the heart and an electric shock sent through the heart. The electricity made all the muscle fibers contract at the same time and when the current was broken the convulsive movements disappeared and the heart was ready to beat again. The heart of a dog is readily thrown into fibrillation by contact with an electric wire and it is just as readily defibrillated with use of the same electricity but more of it and spread over a larger area.

Cases of fibrillation and defibrillation were presented by motion picture to the American Surgical Association in 1937, along with records of patients whose hearts fibrillated during operation. The method for defibrillation also was presented. Ten years later, June 16, 1947, THE JOURNAL reported the case of the first human heart successfully shocked out of fibrillation with complete recovery. Application of the method was extended later to the wards and other parts of hospitals with success. It has been tried without success in concert halls and churches, on the roadside, and on golf courses. Regardless of where electric death occurs the requirements for success are the same.

Fibrillation of the ventricle in the human is produced by an electric charge made within the heart itself. The term "fatal heart attack" might be replaced by "self-electrocution of the heart." A checkerboard distribution of coronary artery blood produces these electric charges. They do not appear when the heart is uniformly deprived of oxygenated blood as in the "blue-baby" but when only part of the muscle is deprived of oxygenated blood as in the presence of an anomalous coronary artery. Children with anomalous coronary arteries cry out with anginal pain and die. Anginal pain and fibrillation are based on the same physiology. Generalized anoxia of the heart is tolerated even when it is severe; localized anoxia is painful and kills even when it is mild. The development of fibrillating charges is independent of an infarct. Conversion of oxygen differentials into electric charges requires further investigation. The old concept of "current of injury" implies that injury of muscle is involved when this current is produced. This concept is not valid. It implies that cyanosed muscle is injured muscle. The fact that a deeply and uniformly cyanosed heart is not injured and does not produce "current of injury" is evidence against this concept. A deeply cyanosed heart maintains electric equilibrium and while its contractions become weakened it does not fibrillate. The key point is the difference between localized anoxia and generalized anoxia.

Coronary heart disease is complex. Hearts with severe reduction in arterial inflow require more blood. Hearts in failure require better muscle. Hearts with adequate inflow but with checkerboard distribution require even distribution. These requirements dictate three approaches to treatment. The first and second are related, respectively, to structural disease in arteries and in muscle. Treatment of structural disease is a difficult research problem. The third yields to treatment by the creation of intercoronary channels. If these channels can be produced, then the treatment of this aspect of coronary heart disease will yield to that procedure which produces them. The physiology and treatment of this aspect of coronary artery disease deserve careful scientific analysis because positive steps in protection and treatment are in the realm of probability. They wait to be understood and applied.

ORGANIZATION SECTION

WOMEN'S AUXILIARY TO HOLD 38th ANNUAL MEETING

A presentation on survival medicine in national defense by Lieut. Col. Ingalls H. Simmons, M.C., will be one of the highlights of the 38th annual convention of the Woman's Auxiliary to the American Medical Association. More than 2,500 physicians' wives will attend the meeting which is being held in conjunction with the A. M. A. Annual Meeting June 8-12 in Atlantic City. Headquarters will be Hotel Haddon Hall. Colonel Simmons, who is director of the department of preventive medicine, Army Medical Service School, Fort Sam Houston, Texas, will speak Tuesday morning during the opening general meeting of the Auxiliary.

National committee meetings and round-table discussions will be held June 6-8 with formal opening of the convention slated for Tuesday morning. Business sessions on Tuesday and Wednesday will be devoted to state and national committee reports and discussions on current projects, ranging from automobile safety and community service to mental health and recruitment of medical personnel. Tuesday's luncheon in honor of Auxiliary national past-presidents will feature Aubrey Gates, Director of the A. M. A.'s Field Service Division, discussing medicine's legislative program.

During Wednesday's general meetings, Frank R. Burrows Jr., field service director of the Chicago Citizens Traffic Safety Board, will discuss the driver's responsibility in auto safety in his speech entitled, "You Can Get Blood Out of a Turnip." A report on alcoholism will be given by Dr. Marvin A. Block, Chairman of the A. M. A.'s Committee on Alcoholism, as part of the Auxiliary's mental health committee program. Speaker at Wednesday's luncheon honoring the President, Mrs. E. Arthur Underwood of Vancouver, Wash., and the President-Elect, Mrs. Frank Gastineau of Indianapolis will be Dr. Gunnar Gundersen, then immediate Past-President of the A. M. A. During this session the Woman's Auxiliary contribution to the American Medical Education Foundation will be given, and A. M. E. F. awards will be presented to the winning auxiliaries.

After the luncheon, two films will be shown: "Allied Medical Careers," produced by the Maricopa County (Arizona) Auxiliary and "Crusade for Freedom." In addition, Carol Lane of Shell Oil Company will present a demonstration on traffic safety. Election and installation of national officers will be held Thursday morning with adjournment scheduled for noon.

A postconvention workshop for national officers, directors, committee chairmen, state presidents, and presidents-elect will be held Friday morning to discuss upcoming programs and projects. Dr. Ernest B. Howard, A. M. A. Assistant Executive Vice-President, will speak on new A. M. A. activities, and George Cooley, Secretary of the A. M. A. Council on Medical Service, will discuss medicine's program on health care for the aged citizen. All Auxiliary members, their guests, and guests of physicians attending the A. M. A. Annual Meeting in Atlantic City may participate in all social functions and attend the general meetings of the Auxiliary. One of the outstanding social events will be the annual tea in honor of the Auxiliary President and President-Elect on Monday afternoon, sponsored by Pfizer and Company, a pharmaceutical firm. Local convention arrangements are under the direction of Mrs. David B. Allman of Atlantic City, General Chairman.

GOVERNMENT SERVICES

PUBLIC HEALTH SERVICE

International Fellowships.—International fellowships were awarded to 31 promising young medical scientists from Argentina, Austria, Belgium, Brazil, Chile, Colombia, Denmark, El Salvador, England, Finland, France, Germany, Holland, Peru, Sweden, Switzerland, and Uruguay. Administered by the National Institutes of Health, the program provides one year's postdoctoral medical research training in a United States institution of the recipient's own choosing. Each of the awardees holds a doctoral degree or its equivalent in one of the medical or related sciences and was formally endorsed by a committee of eminent scientists in his own country. Final selection of the recipients was made by a fellowship review board comprised of scientists at the National Institutes of Health. In operation since the beginning of 1958, this program is designed to foster the reciprocal exchange of scientific information and research techniques between the United States and foreign investigators.

Air Pollution Traineeships.—The Public Health Service has established a grants-in-aid program to increase the number, competence, and knowledge of professional personnel engaged in the prevention

and abatement of community air pollution. A limited number of traineeships for training activities relating to the study of the effects, extent, assessment, or control of air pollution will be awarded to persons desirous of obtaining such specialized training and instruction during the 1959-1960 academic year.

A trainee must be a citizen of the United States or have filed a Declaration of Intent. In addition, a postdoctoral candidate must have a doctoral degree from a college or university offering a recognized degree. The regular (12 months) stipend for the postdoctoral trainee (to be prorated and paid on the basis of one-twelfth for each month of training) is $4,800. A stipend level differing from the above in cases of unusual need and on the basis of justification submitted by the applicant would be considered. An additional $360 for each legal dependent (as defined for federal income tax purposes) is allowed for a 12-month period, to be paid in equal monthly installments over the period of actual training. Stipends are not affected by a change of dependency status during the award period. Transportation costs at the rate of six cents per mile as computed by standard mileage charts are allowed to trainees between their present station and the training institution. No allowance is made for return travel, travel of dependents, or shipping charges for personal effects or household goods. Actual cost of tuition and fees will also be paid.

The traineeship is awarded for a period not to exceed 12 months. The trainee is expected to pursue a full-time training program. If support is desired for more than one year, special justification of the additional training should be furnished at the time the initial application is made. Support for additional training will, in all cases, depend on the availability of funds appropriated by the Congress for this program. The Public Health Service may terminate a grant before its expiration date on request of the trainee, on request of the training institution, or because of unsatisfactory performance, unfitness, or inability of the trainee to carry out the purposes of the traineeship. The training period must begin no later than 10 months after the date of notification of traineeship award. The award of a traineeship does not make the trainee an employee of the Public Health Service.

Applications for air pollution training grants-in-aid may be secured from any of the Regional Offices of the Public Health Service or from the Chief, Division of General Health Services, Bureau of State Services, Public Health Service, U. S. Department of Health, Education, and Welfare, Washington 25, D. C. Applicants wishing to start training during the 1959-1960 academic year should submit applications as soon as possible. Training grants will, however, be awarded as vacancies occur, and applications may be submitted at any time. Applications providing for training to start at other than the beginning of the normal academic year should preferably be submitted at least three months prior to the time the applicant wishes to begin training.

FOOD AND DRUG ADMINISTRATION

Public Warning.—Persons who wear contact lenses should avoid using a product called Barnes-Hind Wetting Solution, put up in 2-oz. dropper bottles by Barnes-Hind Ophthalmic Products, Inc., Sunnyvale, Calif., because it is contaminated with Pseudomonas aeruginosa, an organism which can cause blindness. The cleanser has nationwide distribution. Larger, one-pint containers are distributed to practitioners who prescribe or distribute contact lenses. The Food and Drug Administration said there would probably be no harmful effects from use in a normal, healthy eye but that dangerous infection may occur if any injury or infection is already present. Efforts are being made by the company and the government to recall outstanding stocks.

Preserving Fresh Fish.—The use of chlortetracycline to aid in keeping fresh-caught fish in sound condition was authorized by the Food and Drug Administration. The order sets 5 ppm as the maximum amount of the antibiotic that may legally remain on fresh-caught unprocessed seafood. Commercial fishermen will be allowed to use the drug on fresh-caught whole, headed, and gutted fish, shucked scallops, and unpeeled shrimp. It does not allow use of the antibiotic on processed seafood products, including fish cuts, steaks, and fillets, peeled shrimp, and shucked oysters. This drug has been used on uncooked poultry since 1955, and extensive data on its safety are available. A minute amount will remain in fresh seafood treated with the antibiotic and will not always be removed in cooking. Scientists and physicians have determined from available data and feeding tests that the prescribed amount of chlortetracycline can be consumed without harm, even to the few exceptional persons who may have developed a sensitivity to antibiotics. The law requires the labeling of treated seafood products to show that chlortetracycline has been added as a preservative. Commercial fishermen will use the antibiotic as a dip or in the ice as an aid to keeping their catch in sound condition. They may not use it in place of adequate refrigeration nor, because of its use, neglect to maintain thoroughly clean conditions aboard their boats.

Personal.—Charles G. Durbin, V.M.D., was appointed veterinary medical director of the Food and Drug Administration's bureau of medicine, succeeding the late Dr. John H. Collins. Fred J. Kingma, D.V.M., will succeed Dr. Durbin as associate veterinary medical director.

COUNCIL ON LEGISLATIVE ACTIVITIES

THE MEDICAL LEGISLATIVE DIGEST

The Medical Legislative Digest will be published about twice a month, while Congress is in session, by the Council on Legislative Activities. The purpose of the digest, which will take the place of the *Legislative Analysis* previously published by the Washington office, is to serve physicians and others who are directly concerned with or active in national medical legislative activities. The digest will include analyses of new congressional bills, reports on the status of pending medical legislation, and Association legislative activities and policies. It is suggested that copies of the digest be retained for future reference. The *A. M. A. News*, servicing the entire Association membership, will cover items of general interest on medical legislation which were formerly covered in the Washington letter. Since the purpose of the digest is to keep its readers well informed on congressional activities, suggestions for improvement will be most welcome.

Bill Analysis

Medical Expense Tax Deduction.—H. R. 6415 would amend the Internal Revenue Code in order to allow a deduction for all medicine and drugs when the taxpayer or his spouse has attained the age of 65. This bill would increase the medical deduction for taxpayers aged 65 and over. Under present law, a taxpayer in this age group, may deduct only the amount of medical expenses for medicine and drugs which exceed 1% of his adjusted gross income. The proposed law would authorize a deduction from gross income equal to the cost of all medicine and drugs if the expense incurred is primarily for the care of the taxpayer and his spouse. Representative Cramer (R., Fla.) introduced the bill April 15, 1959, and it was referred to the House Ways and Means Committee.

Study of Doctor Shortage in the United States.—H. R. 6417 would provide for the establishment of a commission to study the shortage of doctors of medicine in the United States. This bill would authorize a one-year study of the shortage of doctors in the United States. The study is to be undertaken by a 12-member group to be known as the Commission on the Doctor Shortage in the United States. Its members are to consist of two Senators, two members of the House of Representatives, two representatives from the executive branch of the government, and six members from private life. The medical profession would have representatives in the last group. The commission would give particular attention to (1) the policy of medical schools in limiting the number of student admissions; (2) the number of physicians graduated annually from medical schools in the United States; (3) the extent to which hospitals must seek foreign doctors to fill internships; (4) the number of U. S. citizens studying medicine in foreign countries who could not gain admittance to medical schools in the United States; and (5) the extent to which graduates of foreign medical schools are permitted to practice medicine in the United States.

The commission is to submit a final report to Congress not later than one year after the enactment of the Act. The report may contain recommendations and proposals for constitutional amendments, legislation, and administrative actions which in its judgment are necessary to carry out its recommendations. Representative Dorn (R., N. Y.) introduced the bill April 15, 1959, and it was referred to the Interstate and Foreign Commerce Committee.

Control of Radiation Hazards.—S. 1628 would provide for the vesting of primary responsibility for the protection of the public health and safety from radiation hazards in the Public Health Service of the Department of Health, Education, and Welfare. This bill authorizes the surgeon general of the Public Health Service to undertake research relating to radiation hazards, to make technical service available, to develop uniform standards of radiation protection, and to provide training for professional and technical personnel in matters relating to radiation hazard control. On introducing this bill the author stated that medical, industrial, and commercial use of x-ray machines and radioisotopes have increased the need for controls. The bill defines radiation hazard as "a source of ionizing radiation created or developed by man, including x-ray machines, nuclear reactors and their radioisotopic byproducts, high-energy particle accelerators, concentrated forms of naturally occurring materials, and the fallout constituents of nuclear weapons, which alone or in conjunction with other sources endangers or may endanger the public health."

After consulting with federal, state, and local agencies exercising responsibilities in connection with the control of radiation hazards, the surgeon general is to develop a comprehensive program in which he has the primary responsibility for the control and regulation of such hazards. The program

This is in essence the May 1 issue of *Medical Legislative Digest*.

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is to also include recommendations for procedures to resolve any conflicts between the surgeon general and federal agencies arising out of the discharge of their various responsibilities in this area. The program shall also include recommendations with respect to (1) the role of the states in radiation hazard controls, (2) financing of federal and state activities under the program, and (3) providing assistance to the states in the development of model laws relating to the control of radiation hazards. The program is to be set forth in a report to be submitted to Congress no later than Feb. 28, 1960, together with recommendations for legislation to implement it.

A 15-member National Advisory Council on Radiation Hazard Control would be established to advise and assist the surgeon general. He would be chairman of the council. Other members would be the chairman of the Atomic Energy Commission, the Secretary of Defense, director of National Science Foundation, and 11 members appointed by the President from state and local agencies and public or private organizations. Senator Hill (D., Ala.) introduced the bill April 8, 1959, and it was referred to the Senate Labor and Public Welfare Committee.

Legislation Identical or Similar to Bills Previously Analyzed

Bill Number	Subject	Identical or Similar to	Page
H.R. 6248	Hospitalization; nursing home care and surgical services for Social Security beneficiaries	H.R. 4700	79 (L.A.)
H.R. 6393			
H.R. 6265	Control of radiation hazards	S. 1628	2 (M.D.)
H.R. 6325	Public health and professional nurse traineeship provisions of the Health Amendments Act of 1956	S. 731	46 (L.A.)

Status of Pending Legislation

Air Pollution Control Law.—The Air Pollution Control Law, S. 441, 86th Congress, was amended and favorably reported by the Senate Committee on Public Works on April 13, 1959. Existing law provides for a five-year program (expiring June 30, 1960) with an annual appropriation of 5 million dollars. S. 441, as originally introduced, would have made the Air Pollution Control Law permanent without any limit on appropriations. The amendment to the bill prepared by the Committee on Public Works would extend the law for another four years and authorize annual appropriations up to $7,500,000.

Keogh-Simpson Hearings Soon.—The Senate Finance Committee will probably commence hearings on H. R. 10, 86th Congress, the Keogh-Simpson bill, during the latter part of May. Unfortunately, H. R. 10 reached the Senate too late in the second session of the 85th Congress last year to permit Senator Byrd, Chairman of the Senate Finance Committee, to schedule hearings. If you have not already done so it is suggested that you contact your Senators and advise them of the reasons for your support of this legislation.

A. M. A. Legislative Activities and Policies

Government Employees Health Insurance.—The statement, outlining the Association's position and recommendations concerning S. 94, 86th Congress, was submitted on April 27th to the Post Office and Civil Service Committee of the Senate. This bill, which was analyzed on page 23 of the *Legislative Analysis*, provides for a voluntary health insurance program for federal governmental employees and their dependents.

Board of Trustees Acts on Proposed Legislation.—On April 28th, the A. M. A. Board of Trustees considered the recommendations resulting from the Feb. 28, 1959, meeting of the Council on Legislative Activities. The Board voted to reaffirm its approval of the Keogh-Simpson bill (H. R. 10, 86th Congress) and similar proposals encouraging the establishment of voluntary pension plans by self-employed individuals. It also expressed approval of a bill (H. R. 2549, 86th Congress) authorizing deductions from salaries of government employees for premiums to purchase accident and health insurance contracts.

In line with previous actions taken by the Association, the Board opposed the new Forand Bill (H. R. 4700, 86th Congress) and other legislative proposals which would expand medical coverage under the Social Security Act. These bills include proposals to lower the age requirement for disability benefits and to modify the definition of permanent and total disability. Other Board actions included opposition to proposed veterans' legislation extending presumptions of service-connection for various diseases and bills which would increase governmental control over the processing, distribution, and allocation of drugs.

Chairman of Advisory Committee on Aging Appointed

Former Congressman Robert W. Kean of New Jersey has been appointed chairman of the Advisory Committee for the White House Conference on Problems of the Aging. Although the conference will not take place until January, 1961, the advisory committee will start functioning in the near future. Congressman Kean will assume his duties May 1, and the first meeting of the committee will be held around May 15, 1959.

MEDICAL NEWS

CALIFORNIA

Competitive Examination for Epidemiologist.—The Los Angeles County Civil Service Commission has announced an open competitive examination for epidemiologist (M.D.) to act as advisor and consultant to the Air Pollution Control District, the Board of Supervisors, and all agencies working against smog. Minimum requirements include graduation from an approved medical school and completion of an internship approved by the Council on Medical Education and Hospitals of the American Medical Association; three years' experience in the diagnosis and control of communicable diseases, of which one year must have been in public health work; a California State Physician and Surgeon's Certificate at time of appointment; candidates must not have reached their 68th birthday on date of appointment; they must be citizens of the United States and bona fide residents of the county of Los Angeles by the last day for filing applications. Applications are open to both men and women. For information and applications write the Los Angeles County Civil Service Commission, 501 N. Main St., Los Angeles 12.

COLORADO

Pediatric Fellowships.—The department of pediatrics of the University of Colorado Medical Center, Denver, announced the availability in 1960 and 1961 of pediatric fellowships in allergy, infectious disease, hematology, and premature and newborn nursery. Applicants should be graduates of approved schools of medicine and should have completed at least one or more years of hospital training. Preference will be given to those who are in the course of completing the pediatric hospital training required for the examination of the American Board of Pediatrics. The fellowships, for one or two years, include fundamental laboratory research and clinical investigation, as well as training in clinical diagnosis and management. Inquiries should be sent to Dr. Henry K. Silver, University of Colorado Medical Center, 4200 E. Ninth Ave., Denver 20.

CONNECTICUT

Honor Fifty-Year Physicians.—Four physicians who have completed 50 years of active membership in the Connecticut State Medical Society were honored at the annual dinner of the society April 29. The physicians are Dr. Frank L. Phillips, New Haven; Dr. Charles H. Sprague, Bridgeport; Dr. Charles L. Dichter, Stamford; and Dr. Joseph N. Perreault, Danielson. Dr. Walter I. Russell, retiring president of the society, presented service pins to the 50-year members. The honor roll for 50 years of membership includes 32 other physicians who have previously received service awards. Three women physicians are members of the group: Dr. Jessie W. Fisher, formerly of Middletown and now of St. Petersburg, Fla.; Dr. Maude W. T. Griswold, Harwinton; and Dr. Laura H. Hills, formerly of Willimantic, now of Winter Haven, Fla.

DISTRICT OF COLUMBIA

Citations for Former Interns.—Former Freedmen's Hospital Interns who have been in the practice of medicine 50 or more years, will be honored at the 37th annual meeting of the Association of Former Interns and Residents of Freedmen's Hospital, at the Howard University School of Medicine, June 2-4. Among physicians to be cited are: Dr. William C. McNeill, Washington; Dr. Milton A. Francis, Washington; Dr. Ulysses G. B. Martin, Washington; Dr. George W. S. Ish Sr., Little Rock, Ark.; Dr. Thomas Coleman, Pittsburgh; Dr. John B. Hall, Chicago; Dr. William R. Johnson, Lancaster, Pa.; Dr. Frank W. Avant, Wilmington, N. C.; and Dr. Chester A. A. Gordon, Ark, Va.

FLORIDA

Plan Medical Center Expansion.—Metropolitan Medical Center is the name chosen by the Dade County Board of Commissioners for the new buildings and facilities developing around Jackson Memorial Hospital, the teaching hospital of the University of Miami School of Medicine, Coral Gables. The center will encompass expanded hospital and medical facilities. Under a 6-million-dollar bond issue, the expansion program of the county commission includes seven new additions to existing structures, four new buildings, modernization of present buildings, and an increased capacity of Jackson Hospital itself from 900 to 1,400 beds. In addition, a large area of land adjacent to the hospital has been secured by the commission to provide sites for other facilities, including the medical school's new research and education building; the research section is already under construction, scheduled for completion by the end of the year. A Veterans Administration Hospital with a capacity of 800 beds will be built nearby, and construction is planned for a National Children's Cardiac Hospi-

Physicians are invited to send to this department items of news of general interest, for example, those relating to society activities, new hospitals, education, and public health. Programs should be received at least three weeks before the date of meeting.

tal, a Baptist Hospital, a Cedars of Lebanon Hospital, and an Eye Institute. New headquarters for the area Blood Bank, the Miami Cancer Institute, and the Dade County Department of Health are also part of the future center plan. Already established in the Metropolitan Medical Center network are the United Cerebral Palsy Rehabilitation Clinic and the Crippled Children's Rehabilitation Center.

Open Audiology Clinic.—An audiology clinic was opened recently by the University of Miami School of Medicine, Coral Gables. It conducts diagnostic testing, including tests for recruitment, tone decay, articulation function, social adequacy index, tests for functional hearing loss, and electrodermal response audiometry for pure tone and for speech signals. In aural rehabilitation, Otto J. Menzel, director, stated that the clinic's primary emphasis will be on hearing aid evaluation and consultation. The clinic was established with the help of funds from the Miami Hearing Society and the United Cerebral Palsy Association.

ILLINOIS

Chicago

Meeting of Hospital House Staff Alumni.—The Michael Reese House Staff Alumni Association will hold its annual reunion on Wednesday, June 3, with an open house and luncheon held at the hospital during the day and a banquet at the Furniture Club in the evening (cocktail party, 6:30 p. m.). Former house staff and present attending staff members are urged to make reservations at once by writing the Michael Reese House Staff Alumni Association, 29th Street and Ellis Avenue, Chicago 16.

LOUISIANA

Dr. Goldsmith Given Nutrition Award.—Dr. Grace A. Goldsmith, professor of medicine, Tulane University School of Medicine, New Orleans, was presented the Osborne and Mendel Award for 1959 at the annual meeting of the American Institute of Nutrition April 15. The award, established by the Nutrition Foundation, Inc., and administered through the institute, is given each year for "outstanding recent basic accomplishments in exploratory research in the science of nutrition." Consisting of $1,000 and an inscribed scroll, the award was given to Dr. Goldsmith "for her contributions in the field of macrocytic anemias, especially studies on the specific roles of folic acid and vitamin B_{12}, in the clarification of the interrelationship of tryptophan and niacin in human nutrition, and in the field of protein malnutrition."

MASSACHUSETTS

Dr. Burwell Honored.—Dr. C. Sidney Burwell, Levine Professor of Medicine at Harvard University and the Peter Bent Brigham Hospital, Boston, received the John Phillips Memorial Medal of the American College of Physicians April 22. The medal, signifying "outstanding achievement in the field of internal medicine," was presented at the college's annual meeting. Dr. Burwell is the 21st physician to be honored with the award since it was established in 1929. The award honors Dr. John Phillips, of Cleveland, former assistant professor of therapeutics, Western Reserve University Medical School, who died in 1929. Dr. Amos Christie, of Nashville, Tenn., received the Phillips Memorial Medal in 1958.

MICHIGAN

Dr. Tourtellotte Receives Neurology Award.—Dr. Wallace W. Tourtellotte, assistant professor of neurology, University of Michigan Medical Center, Ann Arbor, received the S. Wier Mitchell Award at the annual meeting of the American Academy of Neurology, April 16. The $250 award acknowledged his original work on the chemistry of cerebrospinal fluid. It is given each year to a junior member of the academy "in recognition of his accomplishments and research." Dr. Tourtellotte was one of several U-M scientists who recently analyzed the fatty content of normal spinal fluid, reportedly for the first time.

Causes of Death.—The Michigan Department of Health reported that two changes occurred among the 10 leading causes of death in Michigan during 1958. Arteriosclerosis moved up from eighth to seventh spot, changing places with immaturity, and postnatal asphyxia and atelectasis replaced cirrhosis of the liver as the 10th leading cause. Deaths in Michigan last year totaled 65,460, according to the health department's provisional figures. This was a decrease of 484 from the comparable figure for 1957. As they have for the last half century, heart diseases ranked as the leading cause of death in Michigan last year. However, deaths from this cause were 144 fewer than the previous year. Other leading diseases that caused fewer deaths in 1958 than in 1957 were strokes, accidents, pneumonia and influenza, congenital malformations, and immaturity. Cancer, the second leading cause of death again in 1958, claimed 154 more lives than in 1957. Other causes that took more lives in 1958 than in 1957 were diabetes, arteriosclerosis, and postnatal asphyxia and atelectasis.

MISSOURI

Annual Lecture.—The 1959 Leo Loeb Lectureship, sponsored by Mu chapter of Phi Beta Pi Medical Fraternity, will be held at Wohl Auditorium, Washington University School of Medicine, St. Louis, Thursday afternoon, May 28. Dr. Jonathan E. Rhoads, of the department of surgery, Hospital of

the University of Pennsylvania, will speak on "Preventive Surgery in the Field of Cancer—Studies on the Justification of Risk."

Personal.—Dr. Samuel L. Aspis, manager of the Veterans Administration hospital at Poplar Bluff was named manager of the VA hospital at Kansas City, Mo. He assumed his new post April 26.—Dr. Robert L. Jackson, chairman, department of pediatrics, was appointed chairman of the Committee on Infant Nutrition by the Food and Nutrition Board of the National Research Council. This committee is charged with the responsibility of accumulating and interpreting scientific data available, defining the unsolved problems of infant nutrition, pointing out areas for future research, and advising the National Research Council on revision of recommended dietary allowances.

NEW YORK

Conference on Residency Problems.—Physicians receiving residency training in surgery at university hospitals met at the University of Rochester School of Medicine and Dentistry, May 7-9, at the first Conference of University Surgical Residents, designed "to afford an informal opportunity to explore common problems." The conferees heard from Dr. Seymour I. Schwartz, senior instructor in surgery at the University of Rochester, and from Dr. Donald G. Anderson, dean, UR School of Medicine and Dentistry, Dr. W. J. Merle Scott, chairman, department of surgery, and Dr. Theodore I. Jones, chief surgical resident. Discussions were held on clinical problems concerning portal hypertension, peptic ulcer and esophagitis, acute abdomen and pancreatitis, management of shock and trauma, and carcinoma and transplantation. A round-table discussion was held on the problems of surgical residency training at university hospitals.

Personal.—Dr. Robert L. Brown was appointed an assistant dean of the University of Buffalo School of Medicine. From 1952 until 1954, Dr. Brown served as director of professional services, The Armour Laboratories, Chicago. Recently, Dr. Brown was the medical and technical director for the Arner Co., Inc. of Buffalo.—Dr. Louis E. Daily, Norwich Pharmacal Company vice-president in charge of its Eaton Laboratories division, was named as a member of the Department of Defense advisory panel on medical sciences by Herbert F. York, Ph.D., director of defense research and engineering. The 21 civilian consultants appointed to the panel will provide advice on research, development, and engineering aspects of the defense program in the fields of aviation medicine, atomic medicine, psychiatry, and other pertinent medical sciences. Dr. Richard A. Kern, Temple University School of Medicine, is chairman of the panel.

New York City

Memorial Lecture.—The 23rd Adam M. Miller Memorial Lecture at the State University of New York Downstate Medical Center in Brooklyn was delivered April 20 by Dr. Charles S. Davidson, associate professor of medicine, Harvard Medical School, Boston. Dr. Davidson spoke on "The Mechanism of Death in Cirrhosis."

Dr. Horecker Appointed Department Chairman.—Bernard L. Horecker, Ph.D., was appointed professor and chairman of the department of microbiology of New York University College of Medicine. He succeeds Alwin M. Pappenheimer Jr., Ph.D., who became chairman of tutors of the department of biological chemistry at Harvard Medical School, Boston. Dr. Horecker came to NYU from the National Institute of Arthritis and Metabolic Diseases of the National Institutes of Health, where he was chief of the Laboratory of Biochemistry and Metabolism (1956-59).

NORTH CAROLINA

Grant for Program in Heart Research.—Bowman Gray School of Medicine, Winston-Salem, has been awarded a $568,480 grant by the National Institutes of Health to establish a program for training scientists in heart research. The grant, made by the Training Grants Section, National Heart Institute, Bethesda, Md., covers five years. Of the total, $260,000 will provide yearly stipends for trainees in all levels of the program. Purpose of the program is to prepare men and women for academic careers in all phases of cardiovascular research and teaching. It will be directed by a 10-man faculty committee headed by Dr. Harold D. Green, chairman, department of physiology and pharmacology. The departments of physiology and pharmacology, medicine, surgery, and radiology will have major roles; other departments will assist. Each trainee will be required to follow the complete program with some details individualized according to needs. The courses will include a broad survey of current cardiovascular knowledge, basic training in experimental techniques, participation in current research projects progressing to individual projects, and experience in "good teaching techniques." Trainees will work in all allied techniques and scientific disciplines, including anatomy, embryology, biochemistry, pathology, physiology, pharmacology, medicine, surgery, and radiology. Courses will be open to graduate physicians, holders of the Ph.D. degree who wish to specialize in the cardiovascular field, holders of the master's degree who are candidates for the Ph.D. degree, medical students who wish to drop out of medical school after the second year and resume their regular medical course later, and certain candidates for the master's degree.

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OHIO

Dr. Sabin Named Award Recipient.—Dr. Albert B. Sabin, professor of research pediatrics, University of Cincinnati College of Medicine, and developer of an oral polio vaccine now undergoing tests, received the 1959 Howard Taylor Ricketts Memorial Award of the University of Chicago. Dr. Jonas Salk won the award in 1957. Dr. Sabin also is chief of the division of infectious diseases at the Children's Hospital Research Foundation in Cincinnati. He was invited to the University of Chicago campus June 29 to accept the award. The title of his Ricketts Lecture is "Oral Immunization Against Poliomyelitis with Live Attenuated Polioviruses—Developmental Problems, Present Status and Future Possibilities."

PENNSYLVANIA

Alumni Meeting in Atlantic City.—Dr. Gerald S. Backenstoe, 500 Chestnut St., Emmaus, Pa., has announced that the "University of Pennsylvania, Class of 1927M, will hold a reception and dinner Tuesday, June 9, 6 p. m., in the Jerry Backenstoe Suite, Shelburne Hotel," Atlantic City.

VIRGINIA

Conferences on Child Psychiatry.—Lectures and conferences in the fields of child psychiatry and child neurology were planned by professors in residence at the Lynchburg Training School and Hospital, Colony. Four such lectures were conducted Jan. 29-31. Subsequent speakers and lecture dates are as follows:

May 28-30, "Child Psychiatry," Dr. Wilfred C. Hulse, New York City.
July 30-Aug. 1, "Child Neurology," Dr. Walter O. Klingman, Galveston, Texas.
Sept. 24-26, "Child Psychiatry," Dr. Frederick H. Allen, Philadelphia.
Oct. 29-31, "Child Neurology," Dr. Sidney Carter, New York City.
Nov. 19-21, "Child Neurology," Dr. Paul M. Ellwood Jr., Minneapolis, Minn.

For information and registration write Mr. Arve Lee, Administrative Service Director, Lynchburg Training School and Hospital, Colony, Va.

WISCONSIN

Campaign for Medical Library.—A drive to solicit $600,000 from business and industry toward a new $850,000 medical library on the University of Wisconsin campus at Madison was launched by the University of Wisconsin Medical Alumni Association. The library will bear the name of former medical dean Dr. William S. Middleton, chief medical officer for the Veterans Administration, Washington, D. C. The special gifts drive was sanctioned by the University of Wisconsin and by the U. W. Foundation. Medical alumni already have raised some $200,000 from a national membership of more than 4,000 doctors and technicians, according to Dr. Mischa J. Lustok, Milwaukee, alumni general chairman. The campaign's general committee, headed by Mr. F. James Sensenbrenner, Milwaukee, includes the following: Dr. Einar R. Daniels, Milwaukee, president of the U. W. Medical Alumni Association; Dr. Abraham A. Quisling, Madison, president-elect of the U. W. Medical Alumni Association; Dr. Lustok; Dr. Albert G. Martin, Milwaukee, industrial chairman, medical alumni fund drive; and Dr. John Z. Bowers, Madison, dean of the University of Wisconsin Medical School.

Booklet on Business Aspects of Practice.—"The Business Side of Medical Practice," a 50-page booklet, will be presented to each family doctor in the Milwaukee area by the American Medical Association, in conjunction with the Sears-Roebuck Foundation. Here Dr. Stanley W. Hollenbeck, right,

who heads the 250-member Milwaukee Academy of General Practice, receives the initial copy from Mr. H. Ghlee Jenkins, general manager of the Milwaukee area Sears stores and president of the Wisconsin State Chamber of Commerce.

GENERAL

International Anatomical Terminology.—Dr. W. Compere Basom, El Paso, Texas, in his paper on "Nomina Anatomica" presented at the Orthopedic Conference in New Orleans in January, said that this nomenclature is based more or less on the Basle Nomina Anatomica of 1895. The International Anatomical Nomenclature Committee published a revised "Nomina Anatomica" in 1956. In the original form the B. N. A. list of terms amounted to about 5,600. The new list numbers 5,640.

Dermatologists Meet in Atlantic City.—The 79th annual meeting of the American Dermatological Association, Inc., will be held June 1-4 at the Claridge Hotel, Atlantic City, N. J. A total of 28 papers

are scheduled for presentation at the four scientific sessions. The presidential address, "The Dermatologist's Contribution to the Progress in Medicine," will be given by Dr. J. Lamar Callaway, Durham, N. C., to open the meeting. An awards presentation will close the meeting. For information write Dr. Wiley M. Sams, 25 Southeast Second Ave., Miami, Fla., Secretary.

Meeting on Investigative Dermatology.—The 20th annual meeting of the Society for Investigative Dermatology, Inc., will be held June 6-7 at the Ritz-Carlton Hotel, Atlantic City, N. J. A total of 37 papers are scheduled for presentation at four sessions. The presidential address, "Skin Cancer and Basic Research in Dermatology," by Dr. Hermann Pinkus, Monroe, Mich., will open the scientific sessions. Business and executive sessions will precede the morning programs. The dinner will be held June 6, 7 p. m. For information, write Dr. Herman Beerman, 255 S. 17th St., Philadelphia 3, Secretary-Treasurer.

British Psychiatrist Wins Award.—Dr. Maxwell S. Jones, Surrey, England, is the eighth winner of the American Psychiatric Association's $1,000 Isaac Ray Award, given annually to a psychiatrist or member of the bar "for furthering understanding between the two professions." As recipient, Dr. Jones will deliver a series of lectures on psychiatry and the law at George Washington University, Washington, D. C., in the next academic year under the joint auspices of the university's law and medical schools. Dr. Jones directs the Social Rehabilitation Unit at Belmont Hospital in Sutton. Since 1949 he has been on the Council of the Institute of Human Relations at Tavistock Clinic in London. The Award commemorates Dr. Isaac Ray, a founder of APA.

New Science Foundation Publication.—The National Science Foundation, Washington 25, D. C., published its first bimonthly issue of *Science Information News* for February-March. It was designed "to meet the need for reporting and exchanging news of worldwide activities in science communication and documentation." It is planned to develop the periodical so that it will provide service to all groups working in the various disciplines of science information. Although the first issue is slanted toward National Science Foundation activities, it is expected that most of the news will be material contributed by readers in later issues. Mr. Burton W. Adkinson is the head of the Office of Science Information Service, National Science Foundation.

Meeting of Tuberculosis Physicians.—The annual meeting of the American Academy of Tuberculosis Physicians will be held June 6 at the Ritz-Carlton Hotel, Atlantic City, N. J., with Dr. Marcio M. Bueno, New Bedford, Mass., president of the academy, presiding. A total of 19 papers are scheduled for presentation at the morning and afternoon sessions. At the luncheon session, the guest speaker will be Lt. Col. Stephen J. Berte, M.C., U. S. Army, Phoenixville, Pa., who will present "Experiences with Drug Combinations of High Dosages of INH, Daily SM, PAS, and Pyridoxine: An Evaluation of Clinical Results, the Recovery of Tubercle Bacilli from Resected Lung Specimens and Drug Toxicity Data." The presidential address at the luncheon session will be followed by the presentation of awards.

Endocrine Society Meeting.—On June 4-6 The Endocrine Society will hold its meeting at Chalfonte-Haddon Hall, Atlantic City. A total of 93 papers will be presented under the following section titles:

Thyroid.
Adrenal Cortical Syndromes—Steroid Metabolism.
Parathyroids: Pituitary Adrenal System.
Anterior Pituitary.
Estrogens and Androgens.
Pituitary Hormones—Neuroendocrine Mechanism.
Adrenal Gland.
Insulin and Diabetes.

Seventy-six papers will be read by title. The annual dinner will be held at Haddon Hall Hotel at which the presidential address will be given by Dr. E. Perry McCullagh. For information write Dr. H. H. Turner, 1200 N. Walker St., Oklahoma City, Okla., Secretary.

Rise in Traffic Deaths.—The National Safety Council reported that there was a 9% increase in March traffic deaths. The council said that meant 2,790 died in highway mishaps in March this year as compared with 2,560 fatalities for the same month last year. It was the third consecutive month to bring an increase after two years of almost unbroken reductions. The March figure brought the total for the first quarter of the year to 8,080—up 5% from last year's first quarter toll of 7,690. Disabling injuries in the first three months of 1959 were estimated by the council at 300,000. For three months, the council report showed deaths down in 16 states and up in 30, with three unchanged. Cities had a 2% increase in March, according to reports from 693 cities of more than 10,000 population. For three months, these cities showed a 3% increase from last year.

Chest Physicians Convene in Atlantic City.—The 25th annual meeting of the American College of Chest Physicians will be held June 3-7. The Silver Anniversary Convocation will be held the night of June 4. Postgraduate seminars on heart and lung diseases will be presented June 3. Round-table luncheons and "fireside conferences" are arranged, the latter to include the following foreign participants: Jose F. Valiente, San Salvador, El Salvador; Alberto Chattas, Cordoba, Argentina; Miguel Jimenez, Mexico City, Mexico; Leopoldo Molinari B., Lima, Peru; Mauricio Teichholz, Rio de Janeiro,

Brazil; Carlos Zurita Gonzalez, Cabra de Cordoba, Spain. Three panel discussions are planned on "Treatment of Fungus Infections with Particular Reference to the Newer Therapeutic Agents," "Air Transport of Patients with Respiratory Disease," and "The Heart in Pulmonary Disease." Five symposiums are planned under the following titles:

Bronchogenic Carcinoma.
Pulmonary Tuberculosis.
Emphysema, Function Tests and Respiratory Aids.
Esophagus.
Primary Arterial Hypertension.

The annual president's banquet is planned for June 6, 7:30 p. m. Technical exhibits and a motion-picture program are arranged. A program of ladies' activities is planned. For information, write Mr. Murray Kornfeld, 112 E. Chestnut St., Chicago 11.

Cardiology Meeting in Philadelphia.—The eighth annual convention of the American College of Cardiology will be held May 25-29 at the Benjamin Franklin Hotel, Philadelphia, under the presidency of Dr. George W. Calver, Washington, D. C. The scientific sessions will include the following symposiums and moderators:

Some Cardiovascular Aspects of Space Medicine, Capt. Ashton Graybiel, M.C., U.S. Navy, Pensacola, Fla.
Biopathophysiology of Arteriosclerosis, Dr. E. Grey Dimond, Kansas City, Kan.
New Advances in the Radiologic Diagnosis of Heart Disease, Dr. Robert P. Glover, Philadelphia.
Use and Abuse of Cardiac By-Pass, Dr. J. Maxwell Chamberlain, New York City.
Management of Complications Attendant to Cardiac Surgery, Dr. Osler A. Abbott, Atlanta, Ga.
Recent Advances in Clinical Auscultation of the Heart, Dr. W. Proctor Harvey, Washington, D. C.
Phonocardiography and Chest Wall Vibrations, Dr. Aldo A. Luisada, Chicago.
Present and Future of Cineangiocardiography, Dr. Israel Steinberg, New York City.

The convention guest lecture will be given by Tage Astrup, Ph.D., Carlsbergfondets Biologiske Institut, Copenhagen, Denmark, the afternoon of May 28. Fireside conferences, a medical motion picture program, and scientific and technical exhibits are planned. The annual banquet will be held May 28, 7 p. m.

Congress on Rheumatic Diseases in Washington, D. C.—The second Pan-American Congress on Rheumatic Diseases will be held June 2-6 in Washington, D. C., under the auspices of the Pan-American League Against Rheumatism and organized by the Pan-American Committee of the American Rheumatism Association. Dr. Floyd S. Daft, director, National Institute of Arthritis and Metabolic Diseases, will open the meeting with an address. The official languages will be English, Portuguese, and Spanish. A total of 91 papers will be read at the plenary and concurrent sessions, with 74 papers to be read by title. Two panel discussions are planned: "Natural History of Rheumatic Fever" and "Variants of the Rheumatoid Syndrome," moderated by Drs. Gene Stollerman, Chicago, and Currier McEwen, New York City, respectively. Registration fee is $15, with service personnel and medical students, interns, and residents admitted free. For information, write Dr. Edward F. Hartund, 580 Park Ave., New York 21, Secretary.

Prevalence of Poliomyelitis.—According to the National Office of Vital Statistics, the following number of reported cases of poliomyelitis occurred in the United States, its territories and possessions in the weeks ended as indicated:

Area	April 25, 1959		April 26, 1958
	Paralytic Type	Total Cases	Total
New England States			
Maine	..	..	..
New Hampshire	..	..	..
Vermont	..	..	..
Massachusetts	..	..	..
Rhode Island	..	..	..
Connecticut	..	..	..
Middle Atlantic States			
New York	2	4	..
New Jersey	..	..	..
Pennsylvania	..	..	..
East North Central States			
Ohio	1	1	..
Indiana	..	..	1
Illinois	..	..	..
Michigan	..	..	1
Wisconsin	..	..	..
West North Central States			
Minnesota	..	..	..
Iowa	..	..	..
Missouri	1	1	..
North Dakota	..	..	..
South Dakota	..	..	..
Nebraska	..	..	..
Kansas	..	1	1
South Atlantic States			
Delaware	..	..	..
Maryland	..	..	..
District of Columbia	..	..	..
Virginia	..	..	..
West Virginia	..	..	..
North Carolina	..	..	..
South Carolina	1	1	..
Georgia	..	..	..
Florida	1	3	1
East South Central States			
Kentucky	..	..	3
Tennessee	..	..	1
Alabama	..	..	..
Mississippi	1	1	1
West South Central States			
Arkansas	..	..	..
Louisiana	1	1	..
Oklahoma	..	..	..
Texas	1	1	4
Mountain States			
Montana	..	..	..
Idaho	..	..	..
Wyoming	..	..	..
Colorado	..	..	..
New Mexico	..	..	..
Arizona	..	..	..
Utah	..	..	..
Nevada	..	..	..
Pacific States			
Washington	..	..	..
Oregon	..	..	..
California	4	5	1
Alaska	..	..	..
Hawaii	1	1	2
Puerto Rico	..	..	..
Total	14	20	16

Meeting on Legal Medicine.—The American Board of Legal Medicine, Inc., will hold its annual convention meeting at The Hotel Senator, South Carolina Ave., Atlantic City, N. J., Sunday, June 7, 9:30 a. m. The scientific papers, presented exclusively by members, are:

Medicolegal Aspects of Intervertebral Disk, Dr. Mortimer D. Abrashkin, Miami Beach, Fla.
Atomic Energy and the Law, Dr. Theodore W. Bisland, Dallas, Texas.
Medicolegal Aspects of Drunken Driving, Dr. Glenn W. Bricker, Levittown, Pa.
Medicolegal Role of the General Physician, Dr. Arthur H. Coleman, San Francisco.
Air Pollution and the Law, Dr. Sidney I. Franklin, Cleveland.
Space Medicine and the Law, Dr. George A. Friedman, New York City.
Arthritic Aggravation and Trauma, Dr. Louis J. Gelber, New York City.
Medicolegal Aspects of Myelography, Dr. Reuben Leass, Far Rockaway, N. Y.
Evaluation of Disability, Dr. Frank E. Leder, New York City.
Back Pain and Retarded Healing, Dr. Harold Lefkoe, Philadelphia.
Trends in Hospital Liability, Dr. Charles U. Letourneau, Chicago.
Medicolegal Aspects of Senility, Dr. Gustav Machol, Brooklyn.
Liability for Prenatal Injury, Dr. Harold W. Mayberger, Syosset, N. Y.
Medicolegal Aspects of Trauma to Chest, Dr. Jack Reiss, Coral Gables, Fla.
Should Your Patient Drive a Car?, Dr. Edward R. Richter, Lawrence, N. Y.
Urologist in Liability Field, Dr. Benjamin M. Shure, Brooklyn.

All interested persons are invited. There is no registration fee; register by writing to Secretary, Dr. George A. Friedman, 133 E. 58th St., Suite 410, New York 22.

CANADA

Dr. Cameron Receives Psychiatric Award.—Dr. Donald E. Cameron, of McGill University, Montreal, president of the Canadian Psychiatric Association and the past-president of the American Psychiatric Association, is the 1959 recipient of the $2,500 Samuel Rubin Award for outstanding achievements in mental health. The award was presented to Dr. Cameron April 17, by Dr. Paul R. Hoch, New York State commissioner of mental hygiene, and the first recipient of the award in 1957. Dr. Cameron was selected for the award by a professional committee under the chairmanship of Dr. Lewis R. Wolberg, dean of the Postgraduate Center for Psychotherapy, New York City. Dr. Cameron, who was born and educated in Scotland, was professor of neurology and psychiatry at Albany Medical College before going to McGill University in 1943 as chairman of the department of psychiatry.

Meeting of Biological Societies.—The second annual meeting of the Canadian Federation of Biological Societies will be held at the University of Toronto, Ontario, June 9-11. The program is arranged under the following section titles:

Adrenaline and Noradrenaline; Gross Anatomy and Histology; Toxicology; Biochemistry and Physiology; Circulation and Respiration; Histology and Embryology; Carbohydrates; Cancer; Cardiorespiratory and Environmental Physiology; Nutrition; Renal and Gastrointestinal Physiology; Nervous System and Muscle; Biochemistry; Biochemistry and Neurochemistry; Cholesterol Metabolism; Enzymes; Pharmacology; Endocrines; and the Biological Effects of Ionizing Radiation.

Business meetings for the Canadian Physiological Society, Pharmacological Society of Canada, Canadian Association of Anatomists, and Canadian Biochemical Society will be held the afternoon of June 10. A program of teaching films and exhibits are planned. For information write Dr. E. H. Bensley, Room 710, Montreal General Hospital, Montreal 25, Que., Canada.

LATIN AMERICA

Zoonoses Center in Argentina.—The Pan American Sanitary Bureau officially inaugurated its Pan American Zoonoses Center in Azul, Argentina April 25. The center, dedicated exclusively to studying the diseases transmitted between animals and man, is 185 miles south of Buenos Aires, in the province that shares the Argentine capital's name. It is administered by the bureau and financed by the Pan American Health Organization, the bureau's executive organ, and by technical assistance funds from UN/WHO and the Organization of American States. Dr. Benjamin Blood is director of the zoonoses center. In 1956 an agreement was signed between the Argentine Government and the Pan American Health Organization providing for establishment of the center and naming Azul as its site. The bureau is the world's oldest international health organization. It serves as WHO's Regional Office for the Americas.

FOREIGN

International Cytology Conference.—An International Cancer Cytology Conference, sponsored by the Instituto de Oncologia and the Ministry of Health, Madrid, Spain, the International Union Against Cancer, and the Pan American Cancer Cytology Society, will be held in Madrid, Sept. 22-26, 1960. President of the Conference is Dr. Julian Sanz Ibanez, director of the Madrid National Cancer Institute, and vice-presidents are Dr. James E. Ayre, Miami, Fla., Dr. Edmund V. Cowdry, of St. Louis, and Dr. J. Maisin, Louvain, Belgium. Dr. Angel Valle Jimenez has been appointed secretary general and Dr. Pierre-Hubert deWatteville of Geneva, Switzerland, is general program chairman. Representing the U. S. on the Advisory Council are

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Dr. Alexander Brunschwig, Dr. Morris Fishbein, Dr. Ralph W. Jack, Dr. Locke L. Mackenzie, Dr. George O. Gey, Dr. Leonell C. Strong, and Dr. Richard W. TeLinde. The conference will focus world attention on cytology research and advanced methods of cancer control through early cytology diagnosis. For information, write the Pan American Cancer Cytology Society, P. O. Box 633, Coral Gables, Fla.

Section Meetings for Surgeons.—The International College of Surgeons announced the scheduling of 11 section meetings in Europe, Asia, and South America, with places and dates as follows: Thailand Section, Bangkok, May 21; German Section and German-speaking Federation, Hamburg, June 1-3; French Section, Lyons, June 19-21; The Netherlands Section, Amsterdam, July 25-26; Finnish Section, Helsinki, Aug. 8-9; Austrian Section, Vienna, Aug. 19-20; Brazilian Section, Santos, in September; China–Hong Kong Section, Hong Kong, Oct. 30; Thailand Section, Bangkok, Nov. 2; China–Formosa Section, Taipei, Taiwan, in December; India Section, Jaipur, Rajasthan, in December. For information, write to the Secretariat, International College of Surgeons, 1516 Lake Shore Drive, Chicago 10.

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EXAMINATIONS AND LICENSURE

MEDICAL SPECIALTY BOARDS

AMERICAN BOARD OF ANESTHESIOLOGY: *Written.* Various locations, July 8, 1960. Final date for filing application is January 8. Sec., Dr. Forrest E. Leffingwell, 217 Farmington Ave., Hartford 5, Conn.

AMERICAN BOARD OF DERMATOLOGY: *Written.* Several Cities, Oct. 5. *Oral.* Oklahoma City, Jan. 15-18, 1960. The final date for filing all applications is July 1, 1959. Sec., Dr. Beatrice M. Kesten, One Haven Ave., New York 32.

AMERICAN BOARD OF INTERNAL MEDICINE: *1959 Schedule—Written,* Oct. 19. Final date for filing application was May 1. *Oral.* For candidates on the West Coast, Portland, Ore., Sept. 9-12. Final date for filing application was March 1. *Oral.* For candidates on the East Coast, Nov. 6-7, 9-10. Final date for filing application was March 1. Sec.-Treas., Dr. William A. Werrell, One West Main St., Madison 3, Wis.

AMERICAN BOARD OF NEUROLOGICAL SURGERY: Examination given twice annually, in the spring and fall. In order to be eligible a candidate must have his application filed at least six months before the examination time. Sec., Dr. Leonard T. Furlow, Washington University School of Medicine, St. Louis 10.

AMERICAN BOARD OF OBSTETRICS AND GYNECOLOGY: Applications for certificates, new and reopened, Part I, and requests for re-examination Part II are now being accepted. All candidates are urged to make such application at the earliest possible date. Deadline date for receipt of applications is August 1, 1959. No applications can be accepted after that date. Sec., Dr. Robert L. Faulkner, 2105 Adelbert Road, Cleveland 6, Ohio.

AMERICAN BOARD OF OPHTHALMOLOGY: *Oral.* Philadelphia, June 2-6; St. Louis, Oct. 6-10. *Written.* January 1960 in various cities. Applications for the 1960 written examination must be filed before July 1. Sec., Dr. Merrill J. King, Box 236, Cape Cottage Branch, Portland, Maine.

AMERICAN BOARD OF ORTHOPAEDIC SURGERY: *Part II.* Chicago. Jan. 19-21, 1960. The deadline for the receipt of application is Aug. 15, 1959. Sec., Dr. Sam W. Banks, 116 South Michigan Ave., Chicago 3.

AMERICAN BOARD OF OTOLARYNGOLOGY: *Oral.* Chicago, Oct. 5-9. Final date for filing application was April 1. Sec., Dr. Dean M. Lierle, University Hospitals, Iowa City.

AMERICAN BOARD OF PEDIATRICS: *Written.* January 1960. Exec. Sec., Dr. John McK. Mitchell, 6 Cushman Road, Rosemont, Pa.

AMERICAN BOARD OF PHYSICAL MEDICINE AND REHABILITATION: *Written, Part I,* and *Oral, Part II.* Philadelphia, June 12-13. Final date for filing application was February 15. Sec., Dr. Earl C. Elkins, 200 First St., S. W., Rochester, Minn.

AMERICAN BOARD OF PLASTIC SURGERY: *Oral and Written.* Miami, Fla., Oct. 15-17. Final date for submitting case reports is July 1. Corresponding Secretary, Miss Estelle E. Hillerich, 4647 Pershing Ave., St. Louis 8, Mo.

AMERICAN BOARD OF PROCTOLOGY: *Oral and Written.* Philadelphia, September. Final date for filing application was March 15. Sec., Dr. Stuart T. Ross, 320 Franklin Ave., Garden City, N. Y.

AMERICAN BOARD OF PSYCHIATRY AND NEUROLOGY: Chicago, Oct. 19-20; New York, Dec. 14-15; San Francisco, Mar. 14-15, 1960. Training credit for full time psychiatric and/or neurologic assignment in unapproved military programs or services between the dates of Jan. 1, 1950 and Jan. 1, 1954 was terminated on Jan. 1, 1959. Sec., Dr. David A. Boyd, 102-110 Second Ave. S. W., Rochester, Minn.

AMERICAN BOARD OF RADIOLOGY: *Examination.* Chicago, June 2-4. The deadline for filing applications was April 1. Washington, Dec. 6-9. Deadline for filing application is July 1. Candidates examined in Diagnostic Roentgenology may expect to be examined in Physics. A Special Examination in Nuclear Medicine (for diplomates in Radiology or Therapeutic Radiology) will not be given in June 1959. Candidates desiring this examination will be accommodated at the meeting of the Board in Washington, D. C. on December 5. Deadline for filing application is August 1. Sec., Dr. H. Dabney Kerr, Kahler Hotel Bldg., Rochester, Minn.

AMERICAN BOARD OF SURGERY: *Written* examinations (Part I) will be held on December 2, 1959 at various centers to be announced later. Candidates are urged to apply several months before completion of training requirements although the closing date for filing applications is August 1. Those completing training requirements after September 30 cannot be considered for the Part I examination in December of the same year. *Part II.* Columbus, Ohio, May 14-15. Sec., Dr. John B. Flick, 1617 Pennsylvania Blvd., Philadelphia 3.

BOARD OF THORACIC SURGERY: *Written.* Various centers throughout the country, September 1959. Final date for filing application is July 1. *Oral.* September. Final date for filing application is July 1. Sec., Dr. William M. Tuttle, 1151 Taylor Ave., Detroit 2, Mich.

AMERICAN BOARD OF UROLOGY: *Written.* Approximately 25 cities throughout the country, December 4, 1959. *Oral-Clinical* and *Examination in Pathology.* Chicago, February 1960. Final date for filing application is Sept. 1, 1959. Sec., Dr. William Niles Wishard, 30 Westwood Rd., Minneapolis 26, Minn.

DEATHS

Adams, Walter Anderson Ⓜ Chicago; Howard University College of Medicine, Washington, D.C., 1926; assistant clinical professor of psychiatry, Chicago Medical School; fellow of the American Psychiatric Association; at one time practiced in Cleveland, where he was on the staff of the Lakeside Hospital; joint author of "Color and Human Nature"; associated with the Provident Hospital; on the courtesy staff of the Michael Reese Hospital, where he died March 7, aged 58.

Aud, Guy Ⓜ Louisville, Ky.; born Aug. 29, 1887; University of Louisville Medical Department, 1909; past-president and vice-president of the Kentucky State Medical Association; past-president of the Jefferson County Medical Society; in 1950 was presented with a medallion from the American Cancer Society for "distinguished service in cancer control," the first Kentucky doctor to receive the medallion; formerly chairman of the state executive committee of the Kentucky Division, American Cancer Society, and was regional medical director for fourteen Southeastern states for the society and a member of its national board of directors; in 1956 elected an honorary life member of the board of directors of the American Cancer Society, of which he was past-president; member of the founders group of the American Board of Surgery; member and formerly vice-president of the Southern Surgical Association; fellow of the American College of Surgeons; served as a member of the Southern Medical Association, Medical Research Commission of the State of Kentucky, Kentucky Surgical Association, and Phi Chi; veteran of World War I; surgical consultant to medical examining board, Selective Service Board from 1942 to 1946, and in 1947 received the Congressional Selective Service Medal; received a citation from the University of Louisville School of Medicine for 34 years of outstanding service; joined the faculty in 1915 and was professor emeritus of surgery; from 1911 to 1915 fellow in surgery at the Mayo Clinic in Rochester, Minn.; attending surgeon, Louisville General Hospital, St. Joseph Infirmary, and Kosair Crippled Children's Hospital; contributor of chapters in Cyclopedia of Medicine, Surgery, Specialties; resigned in September, 1958, as editor of the *Journal of the Kentucky State Medical Association;* died in St. Joseph Infirmary Feb. 27, aged 71.

Ⓜ Indicates Member of the American Medical Association.

Barclay, Robert Donaldson, Brookfield, Ill.; Dearborn Medical College, Chicago, 1904; for many years resident physician at the British Old Peoples Home; served on the staff of the Argo (Ill.) Hospital; died Feb. 4, aged 88.

Bigger, John Dinsmore, Bradenton, Fla.; University of Kansas School of Medicine, Kansas City, Kan., 1911; for many years a medical missionary in Korea; died Feb. 12, aged 77.

Blackwelder, Robert Guy, Hopkinsville, Ky.; Medical College of Virginia, Richmond, 1932; also a graduate in pharmacy; fellow of the American Psychiatric Association; superintendent of the Western State Hospital; formerly associated with the Huntington (W. Va.) State Hospital, Eastern Shore State Hospital in Cambridge, Md., and the Southwestern State Hospital in Marion, Va.; in 1956 appointed superintendent of the Andrew S. Rowan Memorial Home at Sweet Springs, W. Va.; died Feb. 1, aged 58.

Brand, George Douglas, St. Paul; Northwestern University Medical School, Chicago, 1917; certified by the National Board of Medical Examiners; veteran of World War I; died in New Britain (Conn.) General Hospital Feb. 23, aged 66.

Bresee, Paul H., Los Angeles; University of Southern California College of Medicine, Los Angeles, 1892; served on the staffs of the Hospital of the Good Samaritan and Angelus Hospital; died Feb. 5, aged 87.

Bridges, William Arthur Ⓜ Lutherville, Md.; University of Maryland School of Medicine and College of Physicians and Surgeons, Baltimore, 1915; member of the American Trudeau Society; served as medical superintendent of the Eudowood Sanitarium in Towson, where he died Feb. 23, aged 78.

Brown, Thomas Ponder Ⓜ Thomasville, Ga.; University of Georgia Medical Department, Augusta, 1914; veteran of World War I; died Feb. 22, aged 78.

Bouvy, Leo Benedict Ⓜ La Grande, Ore.; University of Pennsylvania School of Medicine, Philadelphia, 1920; specialist certified by the American Board of Ophthalmology and the American Board of Otolaryngology; member of the American Academy of Ophthalmology and Otolaryngology; fellow the American College of Surgeons; past-president of the Oregon State Medical Society; on the staffs of St. Joseph's Hospital and Grande Ronde Hospital; died in Los Angeles Feb. 18, aged 66.

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Chandler, James Robert ⊗ Magnolia Springs, Ala.; Birmingham Medical College, 1909; veteran of World War I; district physician for the Tennessee Coal and Iron division of the U. S. Steel Corporation for 35 years; past-president of the Bessemer (Ala.) Rotary Club; died in South Baldwin Hospital, Foley, Feb. 18, aged 76.

Christian, William I., Springfield, Ohio; Medical College of Ohio, Cincinnati, 1891; died in the Knights of Pythias Home Hospital Feb. 16, aged 93.

Clark, Fred Orlin ⊗ Syracuse, Ind.; Indiana University School of Medicine, Indianapolis, 1931; president of the Syracuse Planning Commission; veteran of World War II; died Feb. 27, aged 53.

Conner, Robert Everett ⊗ Hickory, Pa.; Western Pennsylvania Medical College, Pittsburgh, 1893; on the staff of the Washington (Pa.) Hospital, where he died Feb. 22, aged 92.

Cooper, John Elbert ⊗ Battle Creek, Mich.; American Medical Missionary College, Battle Creek, Mich., and Chicago, 1902; fellow of the American College of Surgeons; past-president of the Calhoun County Medical Society; on the staffs of the Leila Y. Post Montgomery and Community hospitals; died in the Battle Creek Sanitarium Feb. 11, aged 81.

Dodson, Austin Ingram ⊗ Richmond, Va.; born April 16, 1891; Medical College of Virginia, Richmond, 1916; specialist certified by the American Board of Urology; served as president of the Virginia Urological Association and the Richmond Academy of Medicine; member of the American Association of Genito-Urinary Surgeons and the American Urological Association; fellow of the American College of Surgeons; professor of urology at his alma mater; on the staffs of the Medical College of Virginia, Hospital Division, St. Elizabeth's Hospital, and St. Luke's Hospital; author of "Synposis of Genitourinary Diseases" and "Urological Surgery"; died Feb. 21, aged 67.

Everingham, Sumner ⊗ Oakland, Calif.; Columbia University College of Physicians and Surgeons, New York City, 1910; member of the founders group of the American Board of Surgery; veteran of World War II; associated with the Children's Hospital of East Bay, Peralta and Samuel Merritt hospitals; died March 4, aged 73.

Fairchild, Fred Ross ⊗ Woodland, Calif.; Cooper Medical College, San Francisco, 1902; member of the founders group of the American Board of Surgery; member of the Western Surgical Association; fellow of the American College of Surgeons; served as health officer of Yolo County; veteran of World War I; a founder and member of the honorary staff of the Woodland Clinic Hospital; died Feb. 22, aged 83.

Gallivan, William Francis, Buffalo; University of Buffalo School of Medicine, 1909; fellow of the American College of Surgeons; formerly secretary of the Western New York Surgical Association; member of the medical advisory committee of Blue Cross and Blue Shield; associated with the Millard Fillmore Hospital, Edward J. Meyer Memorial Hospital, and the Emergency Hospital of the Sisters of Charity, where he died Feb. 20, aged 73.

Gelderman, Frederick Herman, Tucson, Ariz.; Chicago Homeopathic Medical College, 1900; died March 9, aged 82.

Gerson, Max Bernhard ⊗ New York City; Albert-Ludwigs-Universität Medizinische Fakultät, Freiburg, Baden, Germany, 1909; author of "Cancer Therapy: Results of Fifty Cases"; died March 8, aged 77.

Greenberg, David ⊗ New York City; University and Bellevue Hospital Medical College, New York City, 1913; past-president of the Bronx County Medical Society; veteran of World War I; for many years police surgeon; associated with the Lebanon and Jewish Memorial hospitals; consulting physician at Morrisania Hospital; died Feb. 25, aged 71.

Greene, Luther D., Richmond, Mo.; University Medical College of Kansas City, Mo., 1891; formerly member of the state legislature; for eight years on the board of regents of the Northwest Missouri State College, Maryville; died Feb. 13, aged 91.

Hombach, William Henry Sr. ⊗ Grand Island, Neb.; John A. Creighton Medical College, Omaha, 1913; veteran of World War I; on the staffs of the Lutheran Hospital and St. Francis Hospital, where he died Feb. 20, aged 69.

Huth, Leo, Follansbee, W. Va.; (licensed in West Virginia in 1902); veteran of the Spanish-American War and World War I; died in the Veterans Administration Hospital, Aspinwall, Pa., Feb. 22, aged 80.

Imler, Daniel Canning, Willow Grove, Pa.; Jefferson Medical College of Philadelphia, 1927; on the staff of Abington (Pa.) Memorial Hospital; died Feb. 26, aged 59.

James, William Alfred ⊗ Chicago; Northwestern University Medical School, Chicago, 1911; served on the faculty of his alma mater; on the staffs of the Garfield Park Community and Bethany hospitals; at one time a staff physician of Commonwealth Edison Company; died March 3, aged 73.

Julien, Eric Alfred ⊗ Turlock, Calif.; Northwestern University Medical School, Chicago, 1911; first president of the staff of the Emanuel Hospital; died Feb. 24, aged 74.

Keyes, Edward Clarence, Salina, Okla.; University of Nebraska College of Medicine, Omaha, 1902; died in the Grand Valley Hospital, Pryor, Feb. 19, aged 81.

Knopf–Bravin, Rita, Pittsburgh; Woman's Medical College of Pennsylvania, Philadelphia, 1922; examining physician of Juvenile Court and school medical inspector for the city health department; on the dispensary staffs of Shadyside and Passavant hospitals; died in the Shadyside Hospital, March 9, aged 61.

Lewis, Lloyd Griffith ⊗ Washington, D. C.; born in Remsen, N. Y., Nov. 10, 1902; Johns Hopkins University School of Medicine, Baltimore, 1928; clinical professor of urology at Georgetown University School of Medicine, where he was associate professor of urology from 1946 to 1948 and professor of urology from 1948 to 1953; instructor, associate and assistant professor of urology at his alma mater from 1933 to 1942; for many years associated with Johns Hopkins University Hospital in Baltimore; served on the staffs of the Georgetown, Doctors, and Walter Reed General hospitals; veteran of World War II; awarded Legion of Merit in February, 1946; consultant in genitourinary surgery to the Secretary of War; specialist certified by the American Board of Urology; member of the American Urological Association; fellow of the International College of Surgeons; died March 2, aged 56.

Long, Vann McKee ⊗ Winston–Salem, N. C.; North Carolina Medical College, Davidson, 1906; county coroner; past-president of the North Carolina Urological Association; honorary staff member of the City Memorial Hospital; died Feb. 19, aged 76.

McConnell, Seth Anderson ⊗ Major, U. S. Army, retired, Galveston, Texas; University of Texas School of Medicine, Galveston, 1916; also held a degree in law; veteran of World War I, and received the Croix de Guerre from the French government; served in the U. S. Army from 1916 to 1929, retiring with the rank of major; formerly associated with the Austin (Texas) State Hospital and the East Louisiana State Hospital in Jackson, La.; died Nov. 18, aged 72.

MacKowiak, Felix A. ⊗ Chicago; Loyola University School of Medicine, Chicago, 1919; served as health commissioner of Riverside, Ill.; associated with Cook County Hospital and St. Mary of Nazareth Hospital, where he was past-president of the staff, and where he died March 5, aged 64.

Matikiewicz, Joseph Peter ⊗ Thompson, Pa.; St. Louis University School of Medicine, 1937; veteran of World War II; died in the Binghamton (N. Y.) City Hospital Feb. 14, aged 52.

Murphy, John Harvey ⊗ Moline, Ill.; Northwestern University Medical School, Chicago, 1906; veteran of World War I; honorary member of the medical staff, Hammond–Henry District Hospital in Geneseo; treasurer of the Moline Horticultural Society; died in the Moline Public Hospital Jan. 29, aged 81.

Morrissey, Paul Gunkle Sr. ⊗ Nashville, Tenn.; University of Nashville Medical Department, 1902; member of the American Urological Association; fellow of the American College of Surgeons; associated with the Nashville General Hospital, where he was past-chairman of the board of commissioners, and Vanderbilt University Hospital; member and past-president and for many years secretary treasurer of the staff of St. Thomas Hospital, where he died Feb. 1, aged 78.

Nelson, William Thomas, Cincinnati; Howard University College of Medicine, Washington, D. C., 1904; died in St. Mary's Hospital Feb. 15, aged 82.

Newmayer, Solomon Weir ⊗ Philadelphia; University of Pennsylvania Department of Medicine, Philadelphia, 1899; served on the faculty of his alma mater; formerly medical inspector of the bureau of health and medical supervisor for the board of education; consulting eye physician for Selective Service during World Wars I and II; associated with Mount Sinai Hospital, Wills Hospital, and the Hospital of the University of Pennsylvania; died in the Lankenau Hospital March 1, aged 81.

Nystrom, Elmer Edwin ⊗ Peoria, Ill.; Northwestern University Medical School, Chicago, 1909; member of the American Academy of General Practice; formerly vice-president of the Mississippi Valley Medical Society; veteran of World War I; associated with St. Francis Hospital and the Methodist Hospital, where he died Feb. 23, aged 74.

Olds, Wilson Albert ⊗ Colville, Wash.; Washington University School of Medicine, St. Louis, 1908; died in Mount Carmel Hospital Jan. 5, aged 75.

O'Leary, John Jeremiah ⊗ Olympia, Wash.; University of Michigan Medical School, Ann Arbor, 1916; veteran of World War I; member of the staff of St. Peter's Hospital, where he died Feb. 16, aged 67.

Orsburn, Roy ⊗ Sebree, Ky.; University of Louisville (Ky.) Medical Department, 1910; served as health officer of Webster, Muhlenberg, Fleming, Garrard, Lincoln, Simpson, Allen, and Marion counties; past-president of the Green River Valley Public Health Association; died Feb. 4, aged 79.

Ott, Howard, Portland, Pa.; Maryland Medical College, Baltimore, 1909; served as president of the school board and postmaster; chief burgess of Portland; member of the staff of the General Hospital of Monroe County, East Stroudsburg, where he died Feb. 14, aged 77.

Parker, Harry Lee ⊗ Rochester, Minn.; born in Limerick, Ireland, Feb. 20, 1894; University of Dublin School of Physic, Trinity College, Dublin, Ireland, 1918; volunteered for service in the Royal

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Army Medical Corps of England in April, 1918, and served in France; in June, 1919, was released from service with the grade of second lieutenant; came to Rochester, Minn., in November, 1919, as a fellow in surgery of the Mayo Foundation; in 1921 transferred his major interest to neurology; appointed to the staff of the Mayo Clinic as a consultant in neurology on Jan. 1, 1925, and instructor in neurology in the Mayo Foundation, Graduate School, University of Minnesota; subsequently was advanced to assistant professor and associate professor; became a citizen of the United States in 1927; returned to Ireland on Aug. 1, 1934, and practiced neurology and psychiatry in Dublin; appointed honorary professor of neurology in Trinity College, and was staff physician to the Richmond, Whitworth, and Hardwicke hospitals, the Stewart Institute for Feebleminded Children, the Bloomfield Mental Hospital, and the Royal Hospital for Incurables; consulting neurologist to the Meath, Mercers, and Orthopedic hospitals in Dublin; returned to Rochester in July, 1945, as a consultant in neurology in the Mayo Clinic and professor of neurology in the Mayo Foundation; specialist certified by the American Board of Psychiatry and Neurology; member of the American Neurological Association, Central Neuropsychiatric Association, British Medical Association, Royal Academy of Medicine in Ireland, the Association of British Neurologists, Central Neuropsychiatric Association, Minnesota Society of Neurology and Psychiatry, and the Alumni Association of the Mayo Foundation; fellow of the Royal College of Physicians of Ireland and of the Royal Society of Medicine of England; past-president of the Royal Academy of Medicine in Ireland and of the Dublin University Biological Association; author of "Clinical Studies in Neurology"; died in St. Mary's Hospital March 1, aged 65.

Pritchett, Asa Belvin ⊗ San Antonio, Texas; University of Texas School of Medicine, Galveston, 1917; member of the staffs of Santa Rosa, Nix, and Baptist hospitals; died Feb. 18, aged 67.

Reece, Herbert Bowen, Sea Bright, N. J.; Albany (N. Y.) Medical College, 1905; member of the American Urological Association; died Jan. 6, aged 77.

Rhodes, Nelson M. ⊗ Urbana, Ohio; Cleveland Homeopathic Medical College, 1906; past-president of the Champaign County Medical Society; served on the board of education for 12 years, eight of which he was president; died in the Mercy Hospital Feb. 16, aged 78.

Rogers, Jennie Maud Thomas ⊗ Canton, Ill.; College of Physicians and Surgeons, Keokuk, Iowa, 1898; member of the American Academy of General Practice; associated with the Graham Hospital; died in the Carle Memorial Hospital, Urbana, Feb. 18, aged 82.

Rogers, Lincoln, Fallbrook, Calif.; University of Southern California College of Medicine, Los Angeles, 1898; died Jan. 21, aged 91.

Rossomondo, Frank David ⊗ New York City; Cornell University Medical College, New York City, 1930; member of the American Trudeau Society and the Industrial Medical Association; president of the board of health, Haworth, N. J.; medical director of the McGraw-Hill publications; associate visiting physician of Bellevue Hospital and French Hospital; died in Paramus, N. J., March 7, aged 56.

Schwarz, Gottwald ⊗ New York City; Medizinische Fakultät der Universität, Vienna, Austria, 1904; honorary member of the American Roentgen Ray Society; served as professor of radiology at the University of Vienna, and director of radiology at the Empress Elizabeth Hospital there; wrote many papers on the aspects of radiological work; died Feb. 26, aged 78.

Schwimmer, Samuel, New York City; Long Island College of Medicine, Brooklyn, 1930; veteran of World War II; served on the courtesy staff of the Beth Israel Hospital, where he died March 3, aged 53.

Scott, Benton Van Dyke ⊗ Waverly, Ohio; Northwestern University Medical School, Chicago, 1918; veteran of World Wars I and II; retired from the regular Navy on June 30, 1939; health commissioner of Fayette, Pike, and Ross counties, with headquarters in Chillicothe; served as health officer of Hickory, N. C., and Houghton–Keweenaw–Baraga District with headquarters in Houghton, Mich.; died in the U. S. Naval Hospital, Bethesda, Md., Feb. 16, aged 64.

Scott, James Underwood, Harrisonville, Mo.; Missouri Medical College, St. Louis, 1894; associated with the Memorial Hospital, where he died Feb. 3, aged 88.

Shields, John Aloysius ⊗ Brooklyn; Columbia University College of Physicians and Surgeons, New York City, 1898; associated with St. Mary's Hospital, where he died Dec. 16, aged 81.

Short, Jacob ⊗ St. Paul; University of Minnesota Medical School, Minneapolis, 1928; veteran of World War II; died in Miami, Fla., Feb. 22, aged 55.

Simpson, Austin Ulysses ⊗ Seattle; College of Physicians and Surgeons of Chicago, School of Medicine of the University of Illinois, 1898; retired chief epidemiologist for the state department of health; formerly chief of laboratories for the state department of health, and at one time assistant director; served in France during World War I; formerly associated with the U. S. Public Health Service; died Feb. 6, aged 89.

Sinks, Edward Dimmitt, Lima, Ohio; Medical College of Ohio, Cincinnati, 1899; veteran of the Spanish–American War; served overseas during World War I; on the staffs of the Lima Memorial and St. Rita's hospitals; died in the Veterans Administration Hospital, Dayton, Feb. 1, aged 81.

Snyder, Roscoe Howe ⊗ Toledo, Ohio; University of Michigan Medical School, Ann Arbor, 1927; member of the American Academy of General Practice; served during World War II; on the staff of St. Vincent's Hospital; died Feb. 21, aged 58.

Stein, David ⊗ Philadelphia; Jefferson Medical College of Philadelphia, 1924; member of the Industrial Medical Association; on the staff of St. Mary's Hospital; died in the Jefferson Hospital Feb. 25, aged 58.

Stratton, Charles Stewart, Lowry City, Mo.; Barnes Medical College, St. Louis, 1899; died Feb. 3, aged 89.

Teaford, Benjamin Jay, Corydon, Ind.; University of Louisville (Ky.) Medical Department, 1902; veteran of World War I; at one time served as health commissioner of Bartholomew County; died Feb. 23, aged 81.

Tinker, Burgoyne Livingstone, West Middlesex, Pa.; Western Pennsylvania Medical College, Pittsburgh, 1902; veteran of World War I; died in the Sharon (Pa.) General Hospital Feb. 24, aged 80.

Tracey, William Wallace, Norwalk, Conn.; Columbia University College of Physicians and Surgeons, New York City, 1916; died Feb. 14, aged 66.

Unruh, Rudolph Theodore ⊗ Kinsley, Kan.; University of Kansas School of Medicine, Kansas City, 1930; served as medical missionary in the African Belgian Congo; veteran of World War II; died in the Edwards County Hospital Feb. 20, aged 59.

Van Pelt, Clifford Alexander Jr. ⊗ Long Beach, Calif.; University of Kansas School of Medicine, Kansas City, Kan., 1937; member of the American Academy of General Practice; vice-president of the General Practice Section, Los Angeles County Medical Association; interned at St. Luke's Hospital in Kansas City, Mo.; veteran of World War II; member of the staffs of the Seaside and St. Mary's hospitals; secretary of the medical staff, Community Hospital, where he died Jan. 27, aged 49.

Vestermark, Seymour Day ⊗ Medical Director, U. S. Public Health Service, retired, Bethesda, Md.; born in Dixon, Ill., Nov. 25, 1902; State University of Iowa College of Medicine, Iowa City, 1931; specialist certified by the American Board of Psychiatry and Neurology; fellow of the American Psychiatric Association, which last January cited him for his outstanding service to psychiatry; from 1948 to 1958 chief of the training and standards branch of the National Institute of Mental Health; past-president of the Commissioned Officers' Association of the U. S. Public Health Service; died in the U. S. Public Health Service Hospital, Baltimore, Feb. 22, aged 56.

Vinnedge, Kenneth Houston ⊗ Captain, U. S. Navy, retired, Quincy, Ill.; born in Waterloo, Iowa, April 21, 1901; University of Illinois College of Medicine, Chicago, 1930; specialist certified by the American Board of Radiology; member of the Radiological Society of North America and the American College of Radiology; entered the U. S. Navy in June, 1929; at different times was chief of the department of radiology at Naval hospitals at Great Lakes, Ill., Philadelphia, Brooklyn, Pearl Harbor, Hawaii, Coca Sola, Canal Zone, and Oakland, Calif.; during World War II was first assigned as senior medical officer on the cruiser Columbia at Guadalcanal, later as staff medical officer of the commander of naval forces in the Southwest Pacific, and finally as executive officer of the naval hospital at Guam; when he retired in May, 1953, was executive officer at the Naval Hospital at Great Lakes; died in Daytona Beach, Fla., March 5, aged 57.

Wood, Kavanaugh Payne, Lena, Miss.; Memphis (Tenn.) Hospital Medical College, 1909; on the staff of the Leake County Memorial Hospital in Carthage Jan. 27, aged 78.

Wood, Lawrence Edward ⊗ Kansas City, Mo.; University of Kansas School of Medicine, Kansas City, Kan., 1926; member of the American College of Chest Physicians and the American Trudeau Society; associate clinical professor of medicine at his alma mater; served as president of the Missouri State Tuberculosis Association and as a member of the board of the National Tuberculosis Association; veteran of World War II; on the staff of the University of Kansas Medical Center in Kansas City, Kan., and St. Luke's Hospital; affiliated with the Veterans Administration Hospital; died Feb. 3, aged 59.

Woods, Limmie Bradford ⊗ Lubbock, Texas; Southwestern University Medical College, Dallas, 1911; during World War II a lieutenant colonel in the Texas State Guard; formerly city health officer; on the staff of the Methodist Hospital; died Feb. 5, aged 71.

Zimmerman, Victor Leo ⊗ Chatham Center, N. Y.; Bellevue Hospital Medical College, New York City, 1897; fellow of the American College of Surgeons and the New York Obstetrical Society; past-president of the Brooklyn Gynecological Society; veteran of the Spanish–American War; associated with Brooklyn, St. Mary's and Holy Family hospitals in Brooklyn, and Mary Immaculate Hospital in Jamaica; died in the Columbia Hospital, Hudson, Feb. 3, aged 87.

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FOREIGN LETTERS

AUSTRIA

Carcinoma of Skin.—At the meeting of the Society of Physicians in Vienna on Feb. 27, Dr. A. Matras stated that in cork tile factories a mixture of cork chips is cast into tiles by adding heated coal tar pitch. The workmen are constantly exposed to special risks due to the effects of the pitch dust which are particularly severe when further exposed to solar irradiation. In the course of years the exposed skin of the workmen develops a bronze pigmentation and a verrucous hyperkeratosis, which forms the basis for the formation of carcinoma which often occurs only after several decades of exposure and develops particularly in the face, hands, and forearms. In a series of six patients carcinoma of the nose was observed in one after eight years of occupational exposure. In the others carcinoma was observed only after an average exposure of 29 years. In five of the six patients the carcinoma was cured by combined surgical removal and irradiation, but one patient died of a pharyngeal extension of the carcinoma.

Progress in Cerebral Angiography.—At the meeting of the Society of Physicians in Vienna on Feb. 20, Dr. H. Brenner described the attempts to make cerebral angiography a more valuable, simpler, and less dangerous procedure. Simple puncture with a cannula armed with a syringe; injection, without a tube, of 3 to 5 cc. of a mixture of methylglucamine salt and sodium salt of 3, 5-diacethylamino-2,4,6-triiodobenzoic acid (Urografin); and simultaneous serial exposures at selectable intervals with the aid of the Siemen's cranial film transport mechanism proved to be highly advantageous in almost 500 angiographies. General anesthesia is limited to a few indications, and local anesthesia is to be avoided. Further advantages of the method include short exposure time, large focal film distance, and large size of picture. Filming was successful in 99.8% of cases. Complications did not occur despite unfavorable factors presented by some patients.

Thrombosis.—At the meeting of the Austrian Society for Gynecology and Obstetrics in Vienna in February, Dr. H. Leeb reported that thrombosis is prevented in his patients by early ambulation, physical exercise, and massage. Chemoprophylaxis is possible only in patients who are in danger. Venostasin (an extract of horse chestnuts containing vitamin B_1) given intravenously for seven days postoperatively proved to be effective insofar as it reduced the thromboses, in a series of 1,393 patients, to almost half of the expected number. The number of infarctions was not influenced. An increase in the number of cases of thrombosis in the week after termination of treatment suggests that prophylactic doses of Venostasin should be continued until the patient is completely recovered. Panthesine (*p*-aminobenzoyl-N-diethylleucinolmethansulfonate), Hydergine (methanesulfonates of hydrogenated ergotoxic alkaloids), and phenylbutazone were used prophylactically. Early ambulation and physiotherapy were considered the most important prophylactic treatment in the control of venostasis. The physician should be on the lookout for early signs of thrombosis. Should a deep thrombosis occur heparin or phenprocoumon should be given.

Varicose Veins.—At the same meeting Dr. K. Sigg stated that it is possible to cure all varicosities in ambulant patients with injections of sclerosing agents. Varicose ulcers also benefit from this treatment. Sclerosing agents should not be used, however, without compression bandages. They should not be injected into patients while they are standing; the leg should be horizontal. Only small amounts of these agents should be used for each injection. Several such injections, possibly in both legs, can be made in one session. The patient should not be confined to bed when she has a reaction to the sclerosing injection, but should continue treatment with firm compression and continue with her work. Fast palliation if severe pain occurs may be achieved by an injection of phenylbutazone. More than half of all varicose ulcers are the result of a deep thrombosis. All such ulcers can be healed by compression with an elastic bandage, which makes the edema disappear. The patient does not have to be confined to bed.

Good prophylactic treatment of thrombosis may prevent the severe, deep, often fatal thrombosis which may be followed by ulcers and varicosities. Treatment of the superficial thrombosis should never consist of bed rest. Incision of the superficial thrombosis results in sudden subjective and objective improvement. On initial treatment a firm compression bandage is applied. This is covered by an elastic bandage. Within several hours after phenylbutazone was given pain was relieved and the swelling and acute redness disappeared. This enabled the patients who were immobilized by pain

The items in these letters are contributed by regular correspondents in the various foreign countries.

to walk again and continue with their work. The deep thromboses should likewise not be treated by bed rest either, except in patients with fracture of the spine or femur or severe systemic disease. Therapy by compression and early ambulation after operations and deliveries combined with the administration of phenylbutazone is important in the prophylactic treatment and constitutes better management than treatment with anticoagulants. Treatment of thrombosis without a compression bandage is inadequate.

Hormonal Cytodiagnosis in Man.—At the same meeting Dr. K. Klein reported having tested the reaction of the male oral mucosa to hormonal stimulation. Cytological and cytometric examinations of 600 oral smears showed that the male oral mucosa, when stimulated by estrogens or androgens, is as a rule subjected to the same laws as the female oral and vaginal epithelium. The sensitivity to hormonal influences, though, is lower than in women. The method is adequate as a morphologic aid in the objectification of disturbances of the sexual hormonal balance in man and their response to therapy.

BRAZIL

Congenital Heart Defects.—Dr. Sylvio Borges and co-workers presented to the Fifth Regional Meeting of the Associação Paulista de Medicina a report on the treatment of 1,000 successive patients with congenital heart defects. They classified their patients as those (1) with a proved diagnosis (326); (2) with clinical findings complemented by electrocardiograms, phonocardiograms, and roentgenograms sufficiently characteristic to establish the diagnosis (321); (3) with a doubtful diagnosis (199); (4) with congenital cyanosis (57); (5) without cyanosis (38); and (6) those difficult to classify (59). A definite diagnosis was made in 647 (the first two groups). The most frequent malformation found was the tetralogy of Fallot, present in 11.2% of patients. The second was the interventricular septal defect (10.7%), followed by the interauricular septal defect (7.9%), patent ductus arteriosus (7.4%), and coarctation of the aorta (2.8%).

Electrocardiography During Artificial Hibernation.—The use of artificial hibernation for cardiovascular operations is increasing every day, but hibernation with circulatory arrest is not without danger. R. Marques Lisboa and co-workers of the Rio de Janeiro Sanatorio Santa Theresa (*Revista brasileira de cirurgia*, vol. 36, 1958) made periodic electrocardiograms of 17 dogs operated on under artificial hibernation with a circulatory arrest of 8 to 10 minutes. They observed that arrhythmia was not present during the induction phase of hibernation. The reduction of the dogs' temperature from 40 to 29 C (104 to 84 F) was responsible for the lessening of the heart rate by an average of 80 beats per minute. During this phase the electrocardiograms frequently showed increase in the duration of the P wave, the P-R interval, the QRS complex, and the QT segment, and modifications in the morphology of the ST-T complex and appearance of the so-called Osborn's waves. The duration of the QT interval showed a striking increase, quite out of proportion to the frequency of the heartbeat. This and the frequent alterations of the morphology of the ST-T complex and the appearance of Osborn's waves suggested the presence of electrolytic disturbances as the main cause of these alterations.

Contrary to the reports of other authors, in no one dog of this series was ventricular fibrillation caused by hypothermia alone. This may have been caused by the fact that the dogs' temperatures never were brought below 26 C (79 F), but the authors observed a marked irritability of the myocardium during handling of the heart by the surgeon, with frequent appearance of ventricular fibrillation; in contradistinction to most reports, however, this fibrillation was reversible by electric shock and massage. This did not occur in only one dog. The occlusion of the circulation during hypothermia was responsible for the appearance of ventricular arrhythmia, in all cases represented by ventricular fibrillation or idioventricular rhythm. Afterwards the QRS complexes became more and more similar to those registered at the beginning of hypothermia, attaining at last a nodal rhythm. In almost every dog the T waves remained negative until awakening. The authors believed that circulatory arrest and ventricular fibrillation cause, in artificially hibernating dogs, an extreme depression of the heart and its conduction system, responsible for the appearance of the idioventricular rhythm. They based their opinion on the marked progressive decrease of the heart rate and the transformation of the QRS complex to more and more abnormal shapes of longer duration in the course of the circulatory arrest.

ICELAND

Poliomyelitis.—Julius Sigurjónsson (*Nord. med.* 61:174-177 [Jan. 29] 1959) stated that poliomyelitis has apparently been endemic in Iceland since 1924 and that extensive epidemics have occurred periodically only once in about 10 years. A marked shift in age selection in the direction of adolescents and adults has been observed in the more recent epidemic years. The shift was considered to be exaggerated, however, as a result of confusion with a simultaneously prevalent poliomyelitis-like disease sometimes called Iceland disease. Of 459 poliomyelitis cases with 89 deaths reported for 1924 148 were in patients under 4, 185 in those between 5 and 14, and the rest in patients between

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15 and 60 years of age. Of 300 cases with 29 deaths reported for 1935 75 were in patients under 4 and 110 were in patients between 5 and 14 years of age. The trend started to change in 1945 with 368 cases and 10 deaths, with 52 in patients under 4 years of age, 110 in the 5-to-14-year-old group, and 113 cases for the 20-to-39-year-old group. In 1946-1947 there were 671 cases with 18 deaths and in 1955-1956 1,154 cases with 3 deaths.

INDIA

Aortic Regurgitation.—V. G. Joshi (*Journal of the Association of Physicians of India*, vol. 7, January, 1959) reviewed a series of 39 patients (32 men and 7 women) who had aortic regurgitation. Of these 25 came to hospital as medical emergencies, with signs and symptoms suggestive of cardiac failure. Only three were asymptomatic. The age at onset of symptoms varied from 15 to 70 years. Although the disease in the earlier age group was predominantly rheumatic in origin and in the later age group syphilitic in origin, this was not always true. Thus one patient with syphilitic aortic lesions came to hospital with signs of heart failure before the age of 25 years while another with a definite history of rheumatic fever and combined mitral and aortic lesions was admitted for heart failure at the age of 40. The interval between primary infection and onset of symptoms in the syphilitic group varied from about 5 to 20 years. The corroborations of syphilis by history and by positive serologic tests were not always correlated. Tertiary cardiovascular syphilis in the form of aortic regurgitation occurred within two years of primary infection in two patients before the age of 25.

Eleven patients complained of precordial or epigastric pains. In one this was due to an enlarged tender liver, in another to hypercyanotic angina, and in the rest to coronary insufficiency. Angina was thus noticed to be an early and important symptom of aortic regurgitation. Only two patients complained of an anginal syndrome before the onset of dyspnea. Three had palpitations and one of these had an irregular rhythm with extrasystoles. Three gave a history of fever and in one this was probably due to subacute bacterial endocarditis. Thirty showed enlargement of the heart.

The first mitral sound was accentuated in eight and weak or partially replaced in three patients. In seven the second aortic sound was normal and in another seven feeble or absent. It was split in one patient. The second pulmonary sound was accentuated in eight and weak in five. An accentuated first mitral sound always indicated concomitant mitral stenosis or left ventricular hypertrophy. A weak or absent second aortic sound was not a constant finding and not diagnostic of aortic regurgitation; but in no case, even with systolic hypertension, was the aortic second sound accentuated. An accentuated pulmonary second sound meant associated mitral disease. A diastolic thrill was palpable at the apex in five patients and a systolic in three. A diastolic thrill at the base was present in two and a systolic in two. A diastolic murmur at the base was heard in 38 and could be described variously as soft, blowing, harsh, musical, early, and to-and-fro. The murmur was heard best on the left side of the sternum in the third and fourth interspace in 22 patients and also equally on the right side of the sternum either alone or in combination with the above in 23.

An associated diastolic thrill was noticed in two. In one it was associated with a diastolic thrill at the apex and in another with a systolic thrill at the base. A systolic thrill over the base was felt in three and indicated associated aortic stenosis. In five patients with a diastolic thrill at the apex there was an associated mitral stenosis, while in two a systolic thrill at the mitral area indicated mitral regurgitation. A combination of systolic and diastolic elements of a to-and-fro murmur heard diffusely over the precordium, the diastolic element of which was heard best to the left of the sternum, was the most frequent auscultatory finding in this series. In four patients with congestive heart failure a diastolic murmur at the base was either missed or absent at the first examination but became apparent when the failure partially resolved after treatment.

Twenty-nine patients had a Corrigan pulse and 33 showed increased pulse pressure. The systolic blood pressure was more than 160 mm. Hg in 12 patients and the diastolic more than 100 mm. Hg in 2. Increased pulse pressure was a more reliable sign than a Corrigan pulse. Four patients had severe and 15 had moderate anemia. The serologic tests for syphilis were strongly positive in 26 patients and doubtful in 2. Radiologically, enlargement of the heart was present in 21 patients, the left ventricle being mainly affected. Seventeen showed diffuse dilatation of the aorta and nine had an enlarged left auricle. The electrocardiogram showed evidence of left ventricular hypertrophy or strain in 21 patients, combined left and right ventricular hypertrophy or strain in 3, and myocardial damage in 16. Thus more patients showed myocardial damage and coronary insufficiency on electrocardiographic examination than clinically.

Causes of Tooth Loss.—F. S. Mehta and co-workers (*Journal of the All-India Dental Association*, vol. 30, December, 1958) analyzed the nature of 11,830 teeth requiring extraction in 4,278 patients. The primary causes of extraction included (1) caries, (2) periodontal disease, (3) impactions, (4) facilitation of better prosthetic restoration, (5) correction or prevention of malocclusion, (6) supernumerary teeth, (7) trauma, and (8) alveolar abscess. Periodontal disease accounted for 66.3% of the teeth

lost and caries for 28.7%. Impactions accounted for only 0.5% and supernumerary teeth for about 0.1%. Extractions due to caries were significantly higher among women than men. The largest number of extractions was in persons 41 to 50 years of age. Extractions due to caries were more frequent in the younger age group (11 to 30) as compared to periodontal disease, while the reverse was true in the older age group. The average number of extractions was maximal in periodontal disease, being 6.24 per patient, while caries accounted for 2.32 teeth per patient. In almost all diseases, the average number of extractions per person was more in women than in men. The number of extractions per patient for prosthetic reasons was high. The average number of extractions per patient increased with increasing age.

UNITED KINGDOM

Artificial Kidney for Streptomycin Poisoning.—It is well known that streptomycin can cause vestibular damage and deafness and that this is more likely to occur in patients with defective renal function. The fact that the drug is normally eliminated from the body by glomerular filtration suggests the possibility that it may be removed in an emergency by extracorporeal hemodialysis. Tests carried out by Edwards and Whyte showed that this is possible, and they now regard the administration of streptomycin in an oliguric patient as a clear indication for early treatment with the artificial kidney (*Brit. M. J.* 1:752, 1959). A simple semiquantitative test showed that streptomycin could be dialyzed from blood across the same cellulose membrane as is used in the artificial kidney. From 40 to 100% of an added quantity of streptomycin diffused across the membrane in 18 hours. Five oliguric patients receiving a dose of more than 1 Gm. of streptomycin were treated by hemodialysis for varying periods. No sign of streptomycin toxicity developed. The authors emphasized the importance of estimating renal function before giving a course of streptomycin.

Hazards of Subway Travel.—At a meeting of the Royal Society of Health Dr. L. G. Norman, the London Transport Executive's chief medical officer, discussed the possibility of banning smoking on London's subway. He thought that public opinion would gradually turn against smoking in public places until no smoking would be permitted in the subway. The London Transport Executive has set up an operational research team to investigate the desirability of increasing the nonsmoking accommodations from 30 to 50% of the total. Dr. Norman said that a taciturn Englishman does not spread infection as readily as his more voluble neighbor. Not talking in trains helps to keep down infection, particularly when large numbers of people stand with mouths and noses in close proximity. The closed mouth minimizes the spread of infection. Dr. Norman also suggested that a few minutes' travel in a train or public vehicle close to an infective neighbor who literally keeps his mouth shut may produce some degree of immunity, as only a small inoculating dose of organisms passes from the infected person to the other.

Inquiry into Drug Prices.—Inquiries into the prices of standard drugs and proprietary preparations were prompted by complaints by the Committee of Public Accounts that pharmacists were enjoying unintended profits on National Health Service drug prescriptions. This was disclosed by the treasury in a comment on the committee's reports. The committee recommended some immediate general reduction in the drug tariff. The treasury now reports that, since March, 1958, the Ministry of Health has made reductions in the reimbursement rates which are estimated to produce savings totaling about $1,064,000 per year. It agrees that so long as the prices actually paid by pharmacists for drugs are not known there can be no assurance that their remuneration is no more than is fair or reasonable. Proposals for further inquiries into the actual cost of drugs are being discussed with the druggists.

Rubella and Pregnancy.—Dr. Julia Bell collected data on the outcome of 712 pregnancies in women who had rubella during pregnancy (*Brit. M. J.* 1:686, 1959). In 694 cases the infection occurred within the first 16 weeks, and in the rest the time of onset was unknown. Information was obtained from hospitals in which the children were born, from questionnaires sent to parents of children just starting school, and from special hospitals for the deaf, the blind, and cardiac cripples. The 712 pregnancies resulted in 421 defects, some children having more than one defect. Cataract was noted in 491 cases (69%), deafness in 263 (37%), and congenital heart disease in 210 (30%). In addition, 70 children were found to show defects other than the three characteristic ones. Many of these defects were not present at 2 years of age but were noted at 6 years or later. The peak incidence of all congenital defects was in children whose mothers had rubella between the fifth and eighth week of pregnancy. This accounted for 35% of the total. The next peak occurred between the 9th and 12th week of pregnancy, during which 100 children, or 24%, were affected. The author believed that abortion should be performed in all cases in which rubella occurs within the first 12 weeks of pregnancy. After that the chances of defects in the offspring are about one in eight.

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CORRESPONDENCE

WHIPLASH INJURIES

To the Editor:—I have read the paper on whiplash injuries by Dr. Emil Seletz in THE JOURNAL, Nov. 29, 1959, and must take issue with many statements therein. The statement is made that "The disturbance of the great occipital nerve is further aggravated by spasm of the trapezius muscle, since traction is thereby exerted on the nerve as it pierces the tendinous attachment of the muscles to the base of the skull." I seriously doubt that spasm of the trapezius muscle is capable of producing traction on the second cervical nerve and would welcome an explanation as to the mechanism of traction on this nerve by spasm of the trapezius.

Dr. Seletz further said, "Please remove the term (whiplash injury) from your wastebasket to a place of prominence on your mahogany desk." Dr. Seletz' orthopedic friend, to whom this statement was directed, probably does not take objection to the term "whiplash" per se but rather feels that it is no more descriptive than the statement that a patient "turned his ankle" in describing a sprain of the ankle joint. Whiplash injury denotes no specific pathological or anatomic derangement, and the term, therefore, has fallen into disrepute. The patient has sustained a strain of the cervical spine, or a fracture, or a dislocation. The mechanism of injury may have been on a whiplash basis, but the pathological fiindings are not a whiplash injury.

Dr. Seletz further stated that, "In addition, the disk portions are even smaller in their relative sizes, because on either side the space is occupied by special synovial joints not present in other parts of the spine. Although described in 1858 by Von Luschka, they are rarely given proper attention because of the misleading diminutive proportion, but the role played by them is most significant." Furthermore, though Dr. Seletz stated that the role of these joints is more significant, he did not elaborate on this. To my knowledge these joints are of relatively little significance, and there is further question that they are actually joints.

Again I quote, "With degenerative thinning of the disk after trauma, the processes of the lateral joints are gradually forced outward and laterally, resulting in osteophyte formation." I doubt that the processes of the lateral joints are forced in any direction. Certainly osteophyte formation may occur as a result of proliferation at ligamentus attachments. I also doubt that the lateral joints are actually "forced out."

Another quotation is "If the blood vessel wall has been traumatized during the injury or the vertebral nerve has been injured, vasospasm persists. The only true, effective measures for tiding over this stage of injury lie in adequate physical therapy." This statement is much too sweeping in its scope, and certainly vascular surgeons and those familiar with the treatment of vasospasm believe that there are multiple adjunctive measures other than "adequate physical therapy" to relieve vasospasm.

Dr. Seletz' statements relative to traction without clarification of the uses and abuses of traction are much too sweeping and are in direct opposition to his earlier statements relative to traction on the second cervical nerve produced by "spasm of the trapezius."

I further would question the following statement: "I personally resent the extensive use of the so-called tranquilizing drugs in this type of case, the sole purpose of which is to confuse the mind so that the patient will not complain." I doubt that any physician has ever prescribed a tranquilizing drug for the purpose of confusing the patient's mind so that the patient no longer complains.

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WHAT IS AN INTERNIST?

To the Editor:—There seems to be increasing interest in defining, in a concise manner, the functions of an internist. Probably because internal medicine is such a broad field, it is easier for the public to think of an internist in terms of what other specialists are not. This leads to the confusing of internists with general practitioners and interns.

In an effort to find a positive, concise definition of an internist, we are publishing in the Program of the 49th Annual Session of the American College of Physicians held in Chicago, April 20-24, 1959, the following suggested definition: "An internist is a physician trained as a specialist in the diagnosis and medical treatment of internal diseases in the adult." We shall welcome criticisms, comments, and improvements on this definition.

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MEDICAL LITERATURE ABSTRACTS

THERAPEUTICS

Acute Granulocytic Leukemia in Pregnancy: Report of Four Cases with Apparent Acceleration by Prednisone in One. H. Rothberg, M. E. Conrad and R. G. Cowley. Am. J. M. Sc. 237:194-204 (Feb.) 1959 [Philadelphia].

Acute granulocytic leukemia was observed in 4 pregnant women, between the ages of 15 and 35 years. Although in a recent comprehensive review of the subject it was maintained that corticosteroids should be preferred to any of the antimetabolites for the treatment of acute leukemia during pregnancy, these 4 cases show that corticosteroids also may have their drawbacks in the therapy of this disease in the pregnant patient. The first of the 4 pregnant women did not receive specific treatment for her acute leukemia; she was delivered spontaneously of a macerated fetus, whose death was attributed to premature separation of the placenta; the mother died 2 days after the delivery. The second woman conceived while being treated with mercaptopurine for her granulocytic leukemia; despite this fact and the prolonged use of mercaptopurine and cortisone, and, in addition, of aminopterin sodium and a trial of desacetylmethylcolchicine (Demecolcin), she was delivered spontaneously of a premature infant, which was free of any malformation, and died 5 days after the delivery. Although the simultaneous use of several drugs made it impossible to attribute either of the 2 remissions in this case to any one agent with certainty, it was clear that cortisone was at least not harmful to the patient and was probably beneficial.

In the third patient the administration of prednisone was associated with a dramatic acceleration of the leukemic process, manifested by a rapid rise in the leukocyte count and severe bone pain. Although the mechanism remains obscure, the case of this patient added to the increasing accumulation of clinical evidence that steroid hormones may aggravate certain cases of acute granulocytic leukemia. Because of this unfavorable experience with steroid therapy, the fourth patient was treated with mercaptopurine only; this drug was given during the last 4 months of pregnancy. The patient bore her pregnancy well and had a full-term normal delivery. There was no evidence of any deleterious effect of the mercaptopurine on the fetus. The only evidence of drug toxicity in the mother was a marked leukopenia during the initial phase of therapy, associated with an acute febrile attack; this was controlled by withdrawal of the mercaptopurine and institution of antibiotic therapy.

The limited life expectancy of the patient with acute leukemia makes it highly unlikely that she can sustain a normal pregnancy. Fetal salvage is low irrespective of treatment. There is no evidence of transplacental transmission of leukemia. In the management of acute leukemia in pregnant women, steroids are not necessarily superior to antimetabolites. The best over-all therapeutic regimen is that which is most effective against the leukemia itself.

Reserpine, Gastric Secretion, and Peptic Ulcer. W. H. Bachrach. Am. J. Digest. Dis. 4:117-124 (Feb.) 1959 [New York].

The author made clinical and laboratory observations on private patients and on patients in the neuropsychiatric hospital of the Veterans Administration Center in Los Angeles, who had been treated with reserpine for hypertension or for psychotherapeutic sedation, as well as on patients treated for peptic ulcers in the gastroenterology section of the Wadsworth Hospital of the V. A. Center. Neither these data nor a review of the literature yielded any convincing evidence that reserpine is an important ulcerogenic agent. Single, orally administered doses of reserpine (0.25 to 0.5 mg.), such as are used in the management of hypertension, stimulate the secretion of hydrochloric acid by the stomach only mildly; this effect may be prevented by the simultaneous administration of a therapeutic dose of an anticholinergic drug. Prolonged therapy with reserpine in these doses does not lead to gastric hypersecretion. Single large doses of reserpine (1 mg. or more), given orally or parenterally, usually provoke an intense and sustained secretion of hydrochloric acid, which is not prevented by even large doses of anticholinergics. The cumulative effects of these large doses are unknown. Large doses of reserpine are

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used in psychotic patients, who should, therefore, be screened for the presence of ulcer before and at intervals during treatment. Reserpine in large doses should be used with caution, or not at all, in patients with ulcer, but the reported data do not indicate that this constitutes an important problem in the over-all applicability of the drug.

Induction of Acute Gastric Lesions by Histamine Liberators in Rats: Effects Thereon of Pharmacologic Blocking Agents. S. Franco-Browder, G. M. Masson and A. C. Corcoran. J. Allergy 30:1-10 (Jan.-Feb.) 1959 [St. Louis].

The authors report on experiments performed on rats to demonstrate the nature of gastric lesions evoked by a potent histamine liberator, polymyxin B, and to attempt an analysis of their mechanism by administration of drugs which are known to block some of the pharmacological effects of naturally occurring amines. Three groups of 12 animals each received treatment, consisting of a single intraperitoneal injection of polymyxin B in doses of 2.0, 1.0, and 0.5 mg. per kilogram of body weight respectively. Within minutes after the injection the animals were in shock, prostrate, cyanotic, and dyspneic. Seven hours later 6 animals from each group were killed, and autopsy was performed. Large, dark, purplish areas, located exclusively in the glandular part of the stomach, were visible through the serous surface. Besides these lesions, hemorrhagic ulcerations were seen in part of the cecum.The glandular mucosa of the stomach showed hemorrhagic erosions which polymyxin B had caused in all the animals, but the effects of the substance were less in those given the smaller doses, the incidence and severity of the lesions decreasing sharply in those given only 0.5 mg. The remaining 6 animals of each group were killed from 1 to 4 days after the injection of polymxyin B. Autopsy revealed that healing of the stomach walls had begun immediately and that epithelization may be complete in 4 days.

The effects of pharmacological blocking agents on the production of gastric lesions were next studied in 80 polymyxin-treated rats. Results in terms of gastric ulceration showed that only the antihistamines and phenoxybenzamine hydrochloride (Dibenzyline), an adrenolytic compound which also possesses antihistaminic properties, afforded protection from the ulcer-inducing properties of polymxyin B. In order of effectiveness the antihistamines were promethazine (Phenergan), chlorpheniramine (Chlor-Trimeton), phenindamine (Thephorin), and parabromdylamine (Dimetane). Phenoxybenzamine was as active as promethazine in protecting against erosions, but two other blocking agents, lysergic acid diethylamide (LSD) and chlorpromazine, had no significant effect on the incidence and severity of gastric ulcerations.

The authors studied the modification of the toxic effects of polymyxin B in 8 rats pretreated with reserpine or dextran. Reserpine in dosage of 3 mg. per kilogram of body weight had been given 48 hours before the injection of polymyxin B to 12 animals in one group and dextran in dosage of 300 mg. per kilogram had been given 24 hours before polymyxin injection to 6 animals in another group. Of the controls, 12 animals received polymyxin B alone, 12 received reserpine alone, and 6 received dextran alone. Polymyxin B elicited shock and death in one-half of the animals in the first group; reserpine provoked drowsiness, piloerection, salivary hypersecretion, and defecation in the animals in the second group; dextran caused only hyperemia and edema of the nose and extremities in the animals in the third group. When polymyxin B was given to rats pretreated with reserpine, shock did not occur, and the extremities were hyperemic rather than cyanotic. Symptoms usually caused by polymyxin B were alleviated in those rats pretreated with dextran; shock did not occur, and only some of the animals experienced moderate dyspnea and cyanosis. Examination of the stomach showed that dextran was the only agent that had not caused gastric lesions, reserpine had provoked the formation of punctiform erosions, but these were insignificant as compared with those evoked by polymyxin B. Reserpine had no effect on the gastric lesions induced in rats that 2 days later received polymyxin B, whereas a prior administration of dextran reduced the severity but not the incidence of the erosions.

These experiments show that the toxic effects of polymyxin B may be modified by other amine liberators and its ulcer-inducing properties may be suppressed by adequate dosages of antihistaminic and adrenolytic agents. The method described provides a new technique for the production of gastric ulcers and for study of their healing.

PATHOLOGY

Benign Thymoma and Selective Erythroid Aplasia of the Bone Marrow. E. M. Jacobs, R. V. P. Hutter, J. L. Pool and A. B. Ley. Cancer 12:47-57 (Jan.-Feb.) 1959 [Philadelphia].

The association of anerythroid anemia and benign thymoma has recently emerged as a clinical and pathological entity. The recognition of this association is of particular interest because of the occasional complete remissions of the anemia after thymectomy. During 1957, 2 patients at Memorial Center for Cancer and Allied Diseases, New York, were found to have this syndrome. Their histories are presented. The first patient, a 58-year-old man, had a thymoma that was benign, or at worst locally malignant, for 18 years before severe anemia developed, which was associated with selective

aplasia of the erythroid precursors in the bone marrow. This man also had mild thrombocythemia of an obscure nature. His death was caused by viral hepatitis presumably resulting from blood transfusions. The second patient, a 64-year-old woman, presented with both a large benign thymoma and anerythroid anemia. In this patient removal of the thymic tumor was followed by complete hematological remission.

Five cases of thymoma with coexisting anemia were reported from 1928 to 1953. Since 1953 an additional 21 cases, including the 2 cases recorded here, have been reported. The clinical features of these 26 patients are analyzed. In 17 of the patients there was a virtual absence of reticulocytes in the peripheral blood and a selective aplasia of the erythroid precursors in the marrow without any other hematological abnormality. The remaining 9 patients had other hematological abnormalities, but the essential change in the bone marrow of 5 of these patients was absence of the erythroid series. Five of the 26 patients had myasthenia gravis in addition to the thymoma.

Since a causal relationship between benign thymic tumors and erythroid aplasia was suggested in previous reports, all cases of thymic tumor in adults seen at Memorial Center for Cancer and Allied Diseases since 1926 were reviewed. There was a total of 30 thymomas with pathological confirmation; 14 were true thymomas, and the others were malignant thymomas of the seminomatous type. Of the 14 patients with benign thymoma, the 2 described here were the only ones who had any degree of anemia. The incidence of myasthenia gravis among these 14 patients was the same. None of 16 patients with malignant thymoma had either this kind of anemia or myasthenia gravis.

Of 46 cases of selective erythroid aplasia reported in the literature, 26 (or 52%) of the patients had an associated benign thymoma. Of 16 patients with this syndrome who underwent thymectomy, 4 patients (including the second one mentioned above) obtained a complete hematological remission, and an additional 3 patients showed definite but incomplete improvement in the anemia. No histological criteria could be defined which were unique to thymomas associated with anerythroid anemia. The authors conclude that benign thymomas are associated with anerythroid anemia with approximately the same frequency as with myasthenia gravis. Therefore, any patient with benign thymoma should be kept under continuous hematological control. Since about half of the adult patients with anerythroid anemia have an associated benign thymoma, search for such a tumor is strongly indicated in any patient who presents this type of anemia. Although thymectomy only occasionally and unpredictably induces hematological remissions, it is the only effective procedure available. The pathogenetic mechanisms relating benign thymoma to anerythroid anemia remain obscure.

Hemangiopericytoma of Stout and Murray. F. Coste, J. Uro and J. Guilaine. Presse méd. 66:2029-2030 (Dec. 25) 1958 (In French) [Paris].

Hemangiopericytoma presents prognostic difficulty, because histological findings may suggest a benign lesion, whereas the medical observation reveals malignancy. It seems that the location of the primary lesion is decisive for the prognosis. The authors report a patient, 51 years of age, in whom a painless and apparently benign tumor, the size of a walnut, appeared on the upper margin of the right popliteal fossa in 1930 and had been quiescent for 20 years. The tumor began to expand in 1950, so that the circumference of the right thigh had been gradually increasing, but without accompaniment of pain. After 6 years of gradual growth on the part of the thigh tumor, pain appeared in the right side of the sacroiliac region, followed after a few months by the appearance of a tumor in the posterior iliac region. The new tumor had the same characteristics, but its growth progressed faster than that of the primary lesion. Roentgenologic examination in July, 1957, revealed osteolysis on the right side of the ilium. The pain grew worse, evolving into sciatic neuralgia a month later.

The tumor in the right thigh was voluminous and appeared to be a sarcoma at the time of the patient's admission. There was a marked venation under the skin of the tumor, and a slightly elevated local temperature. The tumor was not hard in consistency; several nodes were palpated under its skin, mostly in the region of the popliteal fossa. A murmur synchronous with the pulse was auscultated in the thigh. No abnormality of the adjacent lymph nodes was noted. A longitudinal band of indurated tissue, 5 to 6 cm. in length, was palpated in the anterior side of the thigh.

The tumor in the iliac region had features similar to those of the tumor in the thigh, including venation under the skin and a distinct pulsation. Roentgenologic examination revealed the band of indurated tissue under the skin of the thigh tumor and a considerable osteolysis on the right side of the ilium and of the sacroiliac joint, but the bones of the right leg were normal. Specimens of the thigh induration and of the tumor in the popliteal fossa were obtained by biopsy. The microscopic examination revealed that the induration in the anterior side of the thigh was an osteoma unrelated to the tumor in the popliteal fossa. The latter tumor was a whitish mass, well encapsuled, with surface venation, which was diagnosed as a nonmalignant hemangiopericytoma. This case demonstrates the

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incidence of a clinically malignant hemangiopericytoma, which malignancy could not be confirmed by histological findings.

The Use of Selective Media for the Detection of Beta-Haemolytic Streptococci. W. Brumfitt and P. L. Masters. J. Roy. Army M. Corps 105:38-41 (Jan.) 1959 [London].

The isolation of beta-hemolytic streptococci from the throats of healthy carriers and convalescent patients is difficult. Several techniques have been devised to improve the yield of streptococci. Because the authors were examining large numbers of throat swabs, they decided to compare some of these methods. Swabs from 2,000 soldiers not having sore throats were cultured on blood agar, aerobically (method 1), anaerobically (method 2), and aerobically with the addition of crystal violet to the medium (method 3). Swabs from 520 healthy children and adults were plated on blood agar aerobically (method 1), on crystal violet blood agar aerobically (method 3), and after preliminary incubation in an enrichment medium on a selective medium (method 4). Culture on blood agar incubated anaerobically was efficient and gave better results than aerobic incubation. The use of crystal violet blood agar did not significantly increase the yield of streptococci from carriers. Primary culture in sodium azide, crystal violet, blood agar enrichment medium, followed by subculture onto streptomycin and crystal violet blood agar, gave excellent results, but it is rather cumbersome for routine use.

The Lymphomata of the Gastrointestinal Tract. C. J. Uys. South African J. Lab. & Clin. Med. 4:235-248 (Dec.) 1958 [Cape Town].

The author uses the term "lymphoma" in a generic sense to embrace all neoplasms of lymphoid and reticuloendothelial origin. This group of neoplasms includes 2 benign lesions, namely, benign lymphoma of the rectum and giant follicular lymphoma; it also includes the following 4 malignant lesions: reticulum-cell sarcoma, lymphosarcoma, Hodgkin's disease, and plasmacytoma. The records of the pathology department of the University of Cape Town were searched for cases of lymphoma in which the primary lesion was in the gastrointestinal tract. Over the 6-year period from 1952 to 1957; inclusive, 21 primary gastrointestinal lymphomas were recorded, and 18 of these were classified as malignant. These 18 constituted 2.2% of 811 malignant tumors of the gastrointestinal tract seen during that period. Striking variations in localization were apparent. Lymphomas were commonest in the stomach and in the small intestine, but while the incidence of gastric lymphoma relative to other malignancies of the stomach was 2.5%, which is near the over-all figure, in the small intestine they constituted 41.2%. The esophagus, colon, and rectum, where carcinoma is common, are involved to negligible degree by lymphoma.

The presenting clinical features did not differ significantly from those of carcinoma of the same site. In the stomach, irrespective of microscopic appearances, ulcerative, polypoid, and infiltrating macroscopic types were observed; of these the ulcerative variety was commonest. In the intestine the neoplasms were either polypoid or diffusely infiltrating, and both types predisposed to intussusception. Histologically, 9 were classified as reticulum-cell sarcoma, 7 as lymphosarcoma, 1 as Hodgkin's disease, 1 as plasmacytoma, and 3 as benign lymphoma of the rectum. Attention is drawn to the entity "benign lymphoma of the rectum," which on gross appearance is indistinguishable from rectal polyp but which, histologically, may present diagnostic difficulties. Of the 14 patients followed up, only 6 have survived. One patient, alive 3 years after the operation, represents the longest survival. Excluding the benign form, mortality could not be correlated with any histological type, but 5 of the 8 patients who died showed involvement of the regional lymph nodes at the time of operation.

Studies on Bile Pigment in Bile: II. Clinical Considerations on the Bilirubin Content of Bile in Patients with Various Biliary Tract Diseases. T. Sato. Tohoku J. Exper. Med. 68:293-301 (Oct. 25) 1958 (In English) [Sendai, Japan].

While his associates at the surgical clinic, School of Medicine, Hirosaki University, studied the physical and chemical properties of bile during pathological states, the author investigated the bilirubin content in the bile of patients with various disorders of the biliary tract. His studies were made on 49 patients undergoing laparotomy: 11 patients with gallstones (8 with pigment stones and 3 with cholesterol stones), 5 patients with cholecystitis in the absence of stones, and 7 patients with ascariasis of the biliary tract; the remaining 26 patients were free from biliary tract disease and served as controls. The bile samples were obtained by puncture of the gallbladder during operation. The bile in the common duct was studied in 8 patients: 5 with gallstones, 2 with cholecystitis but without gallstones, and 1 with ascariasis of the biliary tract.

The total bilirubin content in the gallbladder bile of the 26 patients without biliary tract disease ranged from 85.5 to 1,890 mg. per 100 cc., its mean value being 799 mg. per 100 cc. Comparing these values with those of investigators who studied Caucasian subjects, the author concludes that the mean bilirubin content of the gallbladder bile of Japanese subjects is lower than that of Caucasians. The mean total bilirubin values in gallbladder bile of Japanese patients with diseases of the biliary

tract were 33.8 mg. per 100 cc. in those with pigment stones, 131 mg. per 100 cc. in those with cholesterol stones, 84.8 mg. per 100 cc. in those with cholecystitis without gallstones, and 130.4 mg. per 100 cc. in those with ascariasis of the biliary tract. The bilirubin content in the common duct bile also decreased, the mean value being 72.2 mg. per 100 cc. Thus, the studies revealed that the bilirubin content of the gallbladder bile as well as the common duct bile was reduced during diseases of the biliary tract, and this trend was especially pronounced in patients with pigment stones. The author investigated not only the total bilirubin values but also the conjugated form and the free form, and the ratio of the conjugated to the total bilirubin content. He found that the conjugated form accounts for nearly 90% of the total bilirubin content of the bile, even in biliary tract diseases.

Serum Cholinesterase in Liver Disease. P. N. Wahi, S. Ramachandran and H. Navani. Indian J. M. Res. 47:13-19 (Jan.) 1959 [Kasauli, India].

The depression of the serum cholinesterase activity during the active phase of acute liver disease and its rise upon recovery have been reported by a number of investigators. It has been claimed that serial studies of this enzyme reflect the changing status of hepatocellular function in such patients better than do the other liver function tests. The present study was undertaken to determine the relative sensitivity of the serum cholinesterase test in comparison with 7 other liver function tests in patients with portal cirrhosis and infectious hepatitis. The following liver function tests were performed simultaneously: (1) thymol turbidity, (2) thymol flocculation, (3) zinc sulfate turbidity, (4) colloidal gold flocculation, (5) prothrombin concentration, (6) serum bilirubin, and (7) serum total proteins and albumin. The tests were made on 30 patients with portal cirrhosis, on 24 patients with infectious hepatitis, and on 30 healthy persons (hospital personnel and blood donors). Serum cholinesterase activity was diminished in all the patients with portal cirrhosis; that is, the serum cholinesterase tests proved far more sensitive than the other tests in indicating functional damage to the liver. In infectious hepatitis, however, the serum bilirubin test gave the highest percentage of positive results, while the determination of the serum cholinesterase proved to be no more sensitive than the turbidity and flocculation tests.

The studies also revealed a close relationship between serum cholinesterase and the serum albumin/globulin ratio, but no such relationship was found between the serum cholinesterase and the serum albumin itself. In some of the patients with infectious hepatitis low values of serum cholinesterase were found even when the serum albumin level was normal but the jaundice severe. This contradicts the observations of other investigators. Some other liver function tests, such as the prothrombin concentration and the colloidal gold flocculation, proved highly insensitive as indicators of functional liver damage and, as a result, are of little clinical value. The serum cholinesterase determination remains the best test for ascertaining mild degrees of functional impairment, at least in portal cirrhosis.

RADIOLOGY

Thromboembolism of the Lungs. J. Arendt and M. Rosenberg. Am. J. Roentgenol. 81:245-254 (Feb.) 1959 [Springfield, Ill.].

Based on roentgenologic findings in patients with thromboembolism of the lungs, examined in the radiologic department of Mount Sinai Hospital, Chicago, the authors emphasize that the incidence of this thromboembolism of either surgical or medical origin has remained high despite greater clinical awareness and better methods of prevention, vein ligation, and anticoagulant treatment. The clinical signs and symptoms are frequently suggestive. Roentgenography or angiocardiography is in a high percentage of cases decisive. Thromboembolism without infarction presents as an abnormal transparency of the involved lung segment (Westermark), with absence of one or both of the large hilar vessels. The heart shadow assumes a peculiar shape, best described as the "amphoric" type (resembling a Greek urn). In the absence of both hilar vessels (pulmonary arteries), a large saddle embolus must be considered.

A thrombus or embolus which is located slightly more peripherally within the main branches of the pulmonary arteries causes a buckling and aneurysmal widening of the vessel, with either a sharp cut-off or tapering at the peripheral end of the embolus. Such thrombus or embolus is compatible with life and leads to the development of either acute or chronic cor pulmonale. In contrast to the cor pulmonale of obstructive emphysema, the position of the diaphragm is elevated, the heart does not assume the vertical position, and within a short time enlargement of inflow and outflow tracts of the right ventricle develops.

Patients with thromboembolism leading to infarction do not, as a rule, present Westermark's sign of increased translucency of a lung segment, since it occurs mostly in a congested lung with dilated bronchial arteries and numerous collaterals. Infarction is common in patients with mitral stenosis, hypertensive heart failure, and coronary insufficiency. Infarcts represent an area of ischemic necrosis usually located at the periphery of the lung. They are rarely "wedge-shaped," as the apex of the wedge is cut off. A "truncated cone" or an

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"umbrella" shape results, which is quite characteristic. Smaller infarcts frequently have a cuboid or meniscus-like appearance. In the costophrenic angle the "hump-shaped" elevation on the medial side of a small pleurisy has frequently been observed and appears diagnostic. The base of the embolic infarcts is sometimes the interlobar fissure line, along which they form a parabolic shadow, which is best seen on a lateral roentgenogram.

The Importance of Chest Roentgenography in the Diagnosis of Pulmonary Embolism. G. N. Stein, J. T. Chen, F. Goldstein and others. Am. J. Roentgenol. 81:255-263 (Feb.) 1959 [Springfield, Ill.].

The authors report on 90 patients in whom a diagnosis of pulmonary embolism was made with the aid of clinical, laboratory, or autopsy findings at the Graduate Hospital of the University of Pennsylvania in Philadelphia between Aug. 1, 1955, and Jan. 31, 1957. Roentgenographic examination of the chest was secured after the onset of symptoms attributable to embolism in 72 of the 90 patients. Abnormal shadows were observed in the roentgenograms of 60 of these patients. Pleural effusions observed in 33 patients and homogeneous shadows resembling those produced by pneumonia and observed in 27 patients were the commonest findings. Elevation of the diaphragm was noted in 21 patients, usually in association with some parenchymal abnormality. Linear shadows, presumably representing focal areas of atelectasis or small interlobar effusions, were observed in 19 patients.

Shadows resulting from embolism appeared rapidly after its onset. Abnormal findings were observed as frequently in roentgenograms made within 24 hours of the onset of symptoms as in those made subsequently. Shadows resulting from embolism were slow to resolve. Abnormal findings cleared within a week in 5 patients and persisted for more than 4 weeks in 19 patients. The correct diagnosis was suggested by the roentgenologist in 10 patients in whom the possibility of pulmonary embolism had not been clinically considered. The diagnosis of embolism was suggested by him in only 39 patients (54% of the 72 patients). His failure to consider this diagnosis in the other patients must be attributed to misconceptions concerning the roentgenologic criteria for diagnosis of pulmonary embolism and lack of familiarity with the clinical manifestations of the disease. The alert roentgenologist will consider pulmonary embolism in the differential diagnosis of every acute cardiorespiratory illness. He will suggest this as a possibility in all patients with pulmonary and pleural shadows resembling pneumonia and pleurisy. Not infrequently, he will recognize characteristic roentgenographic patterns that will provide strong evidence for a diagnosis of pulmonary embolism even when typical clinical manifestations may be absent. The frequency with which pulmonary embolism is clinically diagnosed depends largely on the frequency with which the roentgenologist calls attention to the possibility of this disease.

Treatment of Thyrotoxicosis with ^{131}I: A Review of 500 Cases. G. W. Blomfield, H. Eckert, M. Fisher and others. Brit. M. J. 1:63-74 (Jan. 10) 1959 [London].

The authors describe the results obtained in 500 thyrotoxic patients (398 women and 102 men) treated with radioiodine (I^{131}) in two centers in Sheffield from 1949 to 1958. The following groups were regarded as suitable for treatment with I^{131}: (1) patients over 45 years of age; (2) younger patients in whom there is associated disease, particularly cardiovascular complications, probably reducing the life expectancy to less than 20 years; (3) patients who have relapsed after thyroidectomy; (4) patients who have not remained euthyroid after a course of treatment with antithyroid drugs or have shown toxic reactions to these drugs and who are considered unsuitable for or have refused partial thyroidectomy. Pregnancy is a complete contraindication for this form of treatment.

The intention was to deliver about 7,000 rads in the treatment of the patient with uncomplicated thyrotoxicosis. A slightly greater dose was chosen for patients with severe hyperthyroidism, nodular glands, or disabling cardiac complications. It was regarded as advisable to give slightly smaller doses in the treatment of patients with postoperative recurrences and milder cases with small smooth glands. The calculation of the number of millicuries of I^{131} to be given to the patient to provide the intended rad dose to the thyroid depends on the size of the gland and the proportion of the dose taken up by and retained in the gland. A preliminary tracer test with I^{131} was made, and the uptake at 48 hours was measured to forecast the anticipated uptake of the therapy dose. The formula used in the calculation was explained in an earlier report. The mass of the thyroid was estimated from the results of palpation by several experienced observers. The patients were seen at the thyroid clinic monthly for 2 months after therapy and thereafter at longer intervals. A repetition of treatment was not considered so long as any improvement was noticeable, and at least 3 months had to elapse after the first treatment before a new treatment was given.

After the first treatment 59% of the patients patients became euthyroid and 10% hypothyroid. A further 21% became euthyroid after 2 or more treatments. Hypothyroidism occurred in all in 12% of the patients. A study of the factors that influence the response to treatment revealed that the gland size was the most important, but this was difficult to determine accurately. Hypothroidsm occurred

most frequently in patients with small glands, the size of which was probably overestimated. The age of the patient and wide variations in the uptake and the half-life of I^{131} in the thyroid did not have any consistent effect on the clinical result. Patients with tracheal compression or distortion due to thyroid enlargement were treated. No symptoms due to tracheal compression occurred after therapy, and the subsequent shrinkage of the gland restored the tracheal abnormality towards normal. The irradiation dose to the plasma was calculated for the younger patients. The mean plasma dose was 25 rads, but this was greatly exceeded in a few of the patients receiving 2 or more treatments. Several normal pregnancies occurred after therapy.

Thirty of the 500 patients had died at the time of the completion of this review. In 18 patients death was due to cardiovascular disease; in 4 the cause was carcinoma; and in the remaining 8 death was predominantly due to respiratory infections. The carcinomas responsible for death were in the breast, ovary, rectum, and thyroid. The patient with carcinoma of the thyroid died 9 months after treatment.

Malignant Irradiation for Benign Conditions. B. Cannon, J. G. Randolph and J. E. Marray. New England J. Med. 260:197-202 (Jan. 29) 1959 [Boston].

Some of the disabling and life-endangering consequences of the use of irradiation in the treatment of benign conditions are discussed on the basis of 165 cases from the records of the Massachusetts General Hospital in Boston and from personal files. In many patients it proved impossible to ascertain the exact dosages of irradiation administered, because the treatment was given many years ago by physicians who have died or whose records are either incomplete or unavailable. In professional workers the exposure was in small amounts during a period of many years. Clinical and pathological evidence of chronic irradiation damage in the diseased tissues was enough to incriminate the irradiation exposure as a major factor in the changes observed.

In the 32 patients who had received irradiation (usually multiple treatments) for plantar wart, the average time lapse from exposure to surgical treatment was 5½ years. Nineteen patients with abnormal skin conditions (eczema, psoriasis, lichen planus, and the like) treated with x-rays had severely injured skin and soft tissue. The mean latent period between exposure and skin breakdown in these patients was 14 years. The average time lapse before surgical treatment was requested by 14 patients who had received irradiation in infancy for isolated hemangiomas was 20 years. In 12 patients tissue damage resulted from irradiation for the removal of unsightly hair. This method of epilation was popular about 30 years ago, and its damaging effects are still being observed.

The sequels of irradiation for acne were especially deplorable, since cancer developed in 9 out of 10 patients. A number of other patients with acne scars gave a history of roentgen-ray irradiations. They are not included in this report, because surgical treatment was not recommended, but there is evidence that neoplastic changes can be anticipated in their skins. A number of other patients had received roentgen-ray irradiations sufficient to produce skin damage for such lesions as Dupuytren's contracture, pruritus, pulmonary tuberculosis, goiter, rheumatism, spondylitis, furuncle, gallbladder colic, and cervical adenitis.

Cancer was found in 36 of 165 patients (22%). The interval between irradiation exposure and the establishment of a diagnosis of cancer ranged from 5 to 50 years. In 5 cases the interval was over 40 years. Cancer may still develop in patients more recently exposed. Fourteen of the 36 cancers were of basal-cell type. This is contrary to the accepted teaching that only epidermoid carcinoma is found in irradiated areas. With one exception, a physician's hand, all basal-cell lesions occurred on the face. Surgical therapy should be prompt and thorough, since only by prophylactic excision of all severely injured skin can the malignant transition be avoided. Seventy-six of the 165 patients were presumably cured after one surgical procedure. An additional 15 patients required a second excision. The remainder needed multiple operations.

Some Observations on the Treatment of Radio-Resistant Tumours. G. E. Flatman. J. Fac. Radiologists 10:21-26 (Jan.) 1959 [Bristol, England].

While generally the histological picture indicates the likely degree of radiosensitivity, there are cases in which it is impossible to prejudge what control irradiation will achieve. A well-known example of this variation is the squamous-cell carcinoma of the tongue, a tumor of moderate radiosensitivity which occasionally proves to be completely radioresistant. Conversely, a proportion of the so-called radioresistant tumors, for example, soft-tissue sarcoma, will respond to irradiation. Supervoltage treatment techniques, which have become available in recent years, make possible the delivery of higher tumor dosages with less damage to surrounding normal tissues and minimal constitutional upset. Evidence is now available showing that some of the so-called radioresistant tumors can be effectively treated by irradiation.

At Mount Vernon Hospital, Northwood, England, many of these tumors have been irradiated—in the past by conventional irradiation techniques, and during the last 4 years by means of either the

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4-megavolt linear accelerator or the 1,500-curie Theratron cobalt unit. Irradiation was carried out (1) when there was evidence that surgery alone would not cure the patient, (2) when surgery was impossible on account of the size or situation of the tumor, and (3) when palliation seemed possible despite the advanced state of the tumor. The histories of 7 patients who were treated either by irradiation alone or by combined irradiation and surgery illustrate the value of radiotherapy in the management of some of the radioresistant tumors. A tumor dose of 5,000 r was applied over 5 weeks in the form of deep x-ray treatment (250 kv.) to an osteogenic sarcoma involving the head, neck, and lesser trochanter of the left femur of a 27-year-old woman (case 1). This produced symptomatic relief, but recalcification was slow, and a year later a further dose of 3,500 r was given. After this second course of treatment the bone sclerosed. Later a necrotic ulcer resulting from external trauma made surgery necessary, and histological examination of the operation specimen failed to reveal any viable tumor cells.

In a 41-year-old man (case 2) a spindle-cell sarcoma at the site of operation in the fibula was irradiated with the Theratron cobalt unit to a dose of 7,500 r. A roentgenogram taken 7 months after completion of treatment showed sclerosis of the affected bone with diminution in size of the soft-tissue mass. The patient was symptom-free 18 months later. In a 2-year-old girl (case 3) a fibrosarcoma of the right antrum was treated by means of the linear accelerator to a tumor dose of 7,900 r. More than 12 months after this treatment, the child was free from active disease.

A fibrosarcoma at the back of the thigh of a 69-year-old patient (case 4) was irradiated with the Theratron cobalt unit; 3,400 r was given in 4 weeks, and after 3 weeks' rest a further 4,500 r was given in 6 weeks. The tumor diminished in size, but subsequently broke down, and guillotine amputation was carried out. Examination of 18 blocks of the tumor failed to reveal any viable cells. The patient was still well 3 years later. Chordomas have been successfully treated by irradiation. This is illustrated by the history of a 69-year-old woman (case 5) in whom a sacral chordoma has been controlled by irradiation at both conventional and megavoltages for over 6 years.

Case 6 was that of a 21-year-old man with a large tumor of the right buttock. A year before a small, supposedly benign tumor had been removed from the same site. Biopsy of the recurrence showed it to be a chondrosarcoma. Irradiation was given with the linear accelerator. Later, aspiration of fluctuant material and nitrogen mustard treatment were carried out, and the patient could return to work. A 33-year-old woman with an irremovable carcinoma of the cecum (case 7) received irradiation with the Theratron cobalt unit. This reduced the size of the tumor, so that subsequent resection became possible. The patient was still free from recurrence 18 months later.

BIOCHEMISTRY

Biochemical and Hormonal Changes in Human Beings After Implantation of Yttrium 90 into the Sella Turcica. G. M. Molinatti, A. Pizzini, F. Camanni and others. Minerva med. 49:4014-4021 (Oct. 27) 1958 (In Italian) [Turin, Italy].

Biochemical and hormonal changes related to functional change of the pituitary body were studied in 34 patients with various types and different locations of neoplastic disease after implantation of radioyttrium (Y^{90}) into the sella turcica. A thorough study in time was possible in only 15 patients. The level of urine chorionic gonadotropin decreased in a few patients from 10 to 15 days after implantation of Y^{90}, whereas no change was observed in the remaining patients. No manifest change in the serum inorganic phosphorus level took place either immediately or several months after the operation, although many patients had osseous metastases. Concentration of iodized proteins in plasma showed diminished function of the thyroid gland in 7 patients in a week and in 3 patients from 40 to 60 days after implantation of Y^{90} into the sella turcica. Hypothyroidism was confirmed with the functional test of radioiodine (I^{131}). Increased total serum cholesterol levels were correlated with decreased concentrations of iodized proteins in plasma. Changes in the levels of the urinary 17-ketosteroids and 17-OH corticosteroids indicated a decrease of the function of the adrenal cortex in 6 patients of both sexes 2 weeks after the implantation of Y^{90}. Chromatographic determination of urinary 17-ketosteroid levels suggested a decrease of both gonadal and adrenal functions in 3 patients. Polyuria accompanied by hyposthenuria appeared in several patients from 3 to 5 days after implantation of Y^{90} and disappeared 2 weeks later.

Implantation of Y^{90} into the sella turcica induced an almost total functional insufficiency of the pituitary body in 8 patients (50%). The main clinical effect of the implantation was an acute hypoadrenia, which appeared within 2 weeks of Y^{90} therapy. This disorder was corrected by administration of large doses of cortisone or hydrocortisone. Myxedema developed in 2 patients, and a mild variety of hypothyroidism in another 2 within 50 to 60 days of Y^{90} therapy. Position of the implanted rods of Y^{90}, rather than their numbers, appeared to be important for the radioactive effect of Y^{90}. When the rods were lying on the

external surface of the pituitary, necrosis of the gland was incomplete. Necrosis was almost complete if the rods were inserted into the pituitary. No cell regeneration of residual parenchyma was observed either soon afterward or after 6 months in instances in which partial necrosis of the pituitary body took place. Hypofunction of the pituitary remained unaltered. This study revealed that implantation of Y^{90} into the sella turcica induced in most patients a clear functional insufficiency of the pituitary body.

The Study of the Properdin System of the Body. A. A. Bagdasarov, R. A. Rutberg, I. L. Chertkov and others. Prob. Hematol. & Blood Transfus. (Translation from the Russian.) 3:69-73 (no. 2) 1958 [New York].

The properdin system, a new system of natural immunity recently discovered by Pillemer, consists of the serum protein properdin, magnesium ions, and 4 components of complement. The authors have made active preparations of properdin and of the yeast constituent zymosan, which reacts easily with properdin, and also of the reagents RP (serum deprived of properdin but retaining its complementary activity) and R_3 (serum deprived of the third component of complement [C_3] but retaining the activity of the 3 remaining components of complement); this made it possible to study the blood properdin level in man and animals in the normal state and in various pathological conditions. In the serum of healthy human donors, the properdin titer varied from 4 to 12 units per cubic centimeter (on the average 8 units per cubic centimeter). These results agree with those obtained by Pillemer; thus, the correctness of the authors' method for determining the activity of properdin and also the suitability of zymosan, RP, and R_3 for its titration were confirmed.

The properdin content was studied in 22 patients with various hematological diseases (acute leukemia, leukosarcoma, chronic granulocytic leukemia, lymphocytic leukemia, hypoplastic and aplastic anemia, and hemolytic anemia). No change was detected in the level of properdin in the blood of these patients. The only exceptions were patients with acute leukemia; in 2 patients examined, properdin could not be found. It may be that the disappearance of properdin in these patients was due to their poor general condition. No increase in the blood properdin content was found in 2 patients with paroxysmal nocturnal hemoglobinuria; the blood properdin level in one of these patients, who was severely ill with pronounced hemolysis, was lower (4 units per cubic centimeter) than in the other patient with a milder form of the disease (8 units per cubic centimeter).

In experiments on dogs and rats in which the properdin level in the blood was determined before and after irradiation with roentgen rays, changes in the activity of the properdin system were observed, which confirmed those reported by Pillemer in animals with acute irradiation sickness. In 23 patients with chronic irradiation sickness developing as a result of radiotherapy for malignant neoplasms, the blood properdin titer was determined; it was found to be within normal limits (4 to 12 units per cubic centimeter) in 24. In only one patient was the properdin content in the blood lowered to 2 units per cubic centimeter. This lowering could hardly be attributed to irradiation sickness, since in this patient the disease was not severe. It may be assumed that the lowering of the properdin content in this patient was due to the trauma of a surgical operation not long before the determination of the properdin in the blood.

Serum Cholesterol in Man: Diet Fat and Intrinsic Responsiveness. A. Keys, J. T. Anderson and F. Grande. Circulation 19:201-214 (Feb.) 1959 [New York].

The serum cholesterol concentration in man is strongly influenced by both the amount and the kind of fat in the diet, and it is necessary to distinguish among 3 classes of fatty acids, namely, saturated, monoenoic, and polyenoic. Data obtained from a number of dietary experiments in man yielded a formula by which the responses in the serum cholesterol level to changes in diet can be predicted. The reliability of this formula was tested by the authors on 24 stabilized schizophrenic men who were physically healthy and were maintained on a regimen of constant activity. The effects of various types of fatty acids on the serum cholesterol levels of these men were studied. The results of controlled dietary experiments performed on these men justified the following conclusions: 1. In man, oleic acid glyceride in the diet is the equivalent of equal calories from carbohydrate with respect to the effect on the serum cholesterol level. 2. The glycerides of saturated fatty acids in ordinary food fats raise the serum cholesterol level and the glycerides of unsaturated fatty acids (mainly linoleic acid) lower it; in this respect it requires slightly more than 2 Gm. of linoleic acid to offset the effect of 1 Gm. of a saturated fatty acid, such as stearic or palmitic acid. 3. Intrinsic relative hypercholesteremia is generally associated with relative hyperresponsiveness to dietary fat changes. 4. These relationships allow reasonably accurate predictions of group average responses in serum cholesterol level to given changes in dietary fats.

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BOOK REVIEWS

Don't Worry About Your Heart. By Edward Weiss, M.D. Cloth. $3.95. Pp. 203. Random House, Inc., 457 Madison Ave., New York 22; Random House of Canada, Ltd., 1149 King St., W., Toronto 2, Canada, 1959.

Within the past few years numerous books have been written for laymen who suffer from heart attacks or who have relatives with heart diseases. Some of these have been factual without being interesting, some have been alarming, and some have been written from a biased or faddist viewpoint. A few have been informative, reassuring, and written in such a manner as to be readable and helpful for the patient. This author has approached the problem largely from the viewpoint of the patient and his fears and anxieties. His notable experience in the field of psychosomatic medicine is clear in his presentation. After the introductory chapters succeeding sections of the book cover anxiety and the normal heart, high blood pressure and its management, and anxiety and the diseased heart. The last section includes chapters on coronary heart disease; work, worry, and heart disease; sexual problems and heart disease; the "anniversary" reaction; reactions to heart attacks; valvular heart disease; the psychology of heart surgery; and a brief chapter on cerebral vascular disease. Although there are numerous references to treatment of the organic aspects of heart disease and high blood pressure, the author has concentrated on the question of the relationship of emotion to heart disease. His style is lucid and readable, and he has illustrated his points with many brief case histories. Most patients should find this book helpful and reassuring.

Fracture Surgery: A Textbook of Common Fractures. By Henry Milch, M.D., and Robert Austin Milch, M.D. With chapter on anesthesia by Herbert D. Dubovsky, M.D., Director of Anesthesiology, Easton Hospital, Easton, Pa. Cloth. $17.50. Pp. 470, with 671 illustrations. Paul B. Hoeber, Inc. (medical book department of Harper & Brothers), 49 E. 33rd St., New York 16, 1959.

This book is divided into four major sections. Most of the illustrations are reproductions of roentgenograms, and a large proportion of these present complicated reconstructive problems. Diagrammatic illustrations would have been more forceful for the teaching of students and young surgeons. In the preface the authors state that the book makes no pretense of being either a roentgenographic atlas or a complete treatise on fractures. The problems discussed are thoroughly covered, with the inclusion of more than one solution in most instances. The terminology used in certain chapters is not in common usage in many medical centers.

Chapter 8 is entitled "Compound Fractures"; most orthopedists are now using the term "open fractures" for this problem. In the text, the terms "open" and "compound" are both used. The chapter on axial malalignments is beautifully written and illustrated, but it would have been more effective if the terminology used for the various types of deformities had been directly correlated with the more common nomenclature. Many of the chapters include roentgenographic illustrations of successful reconstructive operations for malunion or nonunion. Only occasionally is there a specific presentation of the operation recommended. The bone graft procedure for persistent nonunion of the tibia, as illustrated in figures 428 and 429, is an exception. Many of the diagrammatic illustrations have been previously published, either in medical journals or by commercial instrument companies. This textbook should be of interest to surgeons with a substantial background in orthopedic and traumatic surgery. It does not appear to be a practical textbook for students or young orthopedists, except as a background reference for certain specific subjects.

Principles of Gynaecology. By T. N. A. Jeffcoate, M.D., F.R.C.S., F.R.C.O.G., Professor of Obstetrics and Gynaecology in University of Liverpool, Liverpool. Cloth. $15. 75 shillings. Pp. 669; 27, with 436 illustrations. Butterworth & Co. (Publishers) Ltd., 88 Kingsway, London, W. C. 2, England; 1367 Danforth Ave., Toronto 6, Canada, 1957.

This book is intended primarily for the undergraduate, but its complete coverage should make it of value to the hospital resident and general practitioner. It is an exceptionally comprehensive, lucid, and practical presentation, with particular emphasis on the psychological and medical rather than the surgical aspects of obstetrics and gynecology. A wide range of subjects is covered, including history-taking, ovarian function, infertility, backache, pregnancy, abortion, and dysmenorrhea and other gynecologic conditions, not only from the pathological aspects but also from the emotional side. Neglected areas such as hysterectomy and its aftermath and preoperative and postoperative management are emphasized. There are excellent sections on female urology and proctology. The pathology of menstruation, breast function, and tumors of the reproductive tract is described in detail. Ample illustrations are provided. Intersexuality, pseudohermaphroditism, and neuroendocrinologic changes involving ovulation and menstruation are adequately covered. The text contains sound premarital advice and discusses contraception and

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marital guidance. It is meant to add to, rather than replace, clinical instruction so that the student will not have to cull the literature. The focus is narrowed to the nonsurgical aspects of gynecology, because these far exceed the surgical problems encountered. This presentation emphasizes the art as well as the science of gynecology. It is highly recommended for the student, the general practitioner, and even the specialist.

Pain. By Harold G. Wolff, M.D., Professor of Medicine (Neurology), Cornell University Medical College, New York City, and Stewart Wolf, M.D., Professor and Head, Department of Medicine, University of Oklahoma School of Medicine, Oklahoma City. Publication number 333, American Lecture Series, monograph in Bannerstone Division of American Lectures in Physiology. Edited by Robert F. Pitts, M.D., Ph.D., Professor of Physiology and Biophysics, Cornell University Medical College. Second edition. Cloth. $4.25. Pp. 121, with 20 illustrations. Charles C Thomas, Publisher, 301-327 E. Lawrence Ave., Springfield, Ill.; Blackwell Scientific Publications, Ltd., 24-25 Broad St., Oxford, England; Ryerson Press, 299 Queen St., W., Toronto 2B, Canada, 1958.

The authors have added a few new items of practical value which were omitted in the earlier edition. The current edition is in the nature of a brief synthesis, reflecting current thinking about pain from the viewpoint of some of the important developments in the past. The book also is designed to be of use to students and practitioners who are confronted with day-to-day problems in the diagnosis and management of painful conditions. Drs. Wolff and Wolf are authorities on the subject of pain, and this book presents a point of view not commonly recognized by physicians and others who must somehow overcome problems of pain. This book should greatly benefit the physician who must deal with such problems and, indirectly, should have some useful results for the patients as well. It is printed on good paper and is easily read. It is indexed and contains an excellent up-to-date list of references on all the various aspects of the problem of pain.

Trauma and Disease: Selections from the Recent Literature. Edited by Alan R. Moritz, M.D., Professor of Pathology and Director of Institute of Pathology, Western Reserve University, Cleveland, and David S. Helberg, J.D. Cloth. $17.50. Pp. 903. Central Book Company, 850 De Kalb Ave., Brooklyn 21, N. Y., 1959.

This volume consists of previously published articles which are reprinted in part or in their entirety, with some explanatory or critical editorial comments. As they frankly admit in their introduction, "the editors have undertaken this republication of the writings of others, dealing with trauma in the causation of disease, with considerable misgiving. Frequently, in our opinion, the evidence presented by the author did not warrant the conclusions drawn from it. Frequently, we were not sufficiently familiar with the subject matter under discussion to be able to judge either as to the adequacy of the evidence or as to the validity of the conclusions drawn from it." The editors believe, however, that these difficulties are at least partially compensated by the fact that many of the articles which they reprint "represent real advances in the field of legal medicine and will almost surely serve to improve the quality of justice in the evaluation of personal injury cases." A large portion of the collection is devoted to articles on stress, but it is presumably owing to the editors' emphasis on problems of jurisprudence that the somatic aspects of stress and the general adaptation syndrome, as well as the biochemical basis of the diseases of adaptation, have been neglected at the expense of legal considerations and the discursive treatment of emotional stress factors. Unfortunately, the volume is not provided with an index, which makes orientation in this large book difficult.

Essentials of Human Reproduction: Clinical Aspects, Normal and Abnormal. Edited by Joseph Thomas Velardo. Contributors: Robert W. Brown, M.D., and others. Cloth. $13.50. Pp. 270, with illustrations. Oxford University Press, 417 Fifth Ave., New York 16, 1958.

This volume represents the collaborative efforts of 13 physicians and research workers in the field of clinical endocrinology to present both the normal and abnormal aspects of human reproduction. After a general introductory chapter on sex hormone relationships the topics discussed include ovulation, menstruation, endocrine changes during pregnancy, disturbances of pregnancy, gynecologic disorders, and infertility. Other chapters are devoted to the anatomy and physiology of the placenta and to endocrine disorders in the male and female reproductive organs. The material is well integrated and each topic is covered in a comprehensive and up-to-date manner. Each chapter concludes with an extensive bibliography and the text is liberally illustrated with excellent reproductions, including both photomicrographs and color plates. This book can be recommended as an authoritative text in the field of human reproduction.

Practical Clinical Biochemistry. By Harold Varley, M.Sc., F.R.I.C., Biochemist, Manchester Royal Infirmary, Manchester, England. Second edition. Cloth. $6.50. Pp. 635, with illustrations. Interscience Publishers, Inc., 250 Fifth Ave., New York 1; William Heinemann, Ltd., 99 Great Russell St., London, W. C. 1, England, 1958.

In the three years since the publication of the first edition of this book on clinical biochemical tests and interpretations enough new information has become available in this field to warrant extensive revision and the publication of a new edition. The chapters on hormones and proteins have been greatly expanded and rewritten, and new sections on hydroxyindoles, transaminases, and mucoproteins have been included. Newer developments in analytical techniques have been added in many chapters throughout the book. The arrangement of the chapters and the presentation of material within each chapter closely follows that of the first edition. Reference is made to recent American and English literature.

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QUESTIONS AND ANSWERS

LOW BACK PAIN

To the Editor:—*A company physician for an organization that manufactures heavy farm equipment is faced with the problem of low back pain in employees who do heavy manual labor. How can the company be protected against alleged liability for low back injuries? What are the pros and cons of obtaining a roentgenogram of the lumbosacral spine as part of the preemployment examination?*

Marion M. Sumner, M.D., Hutchinson, Kan.

Answer.—It may be presumed that the goals of the inquiring physician are to help prevent back injuries for the sake of the welfare of the employees and to help assure that the company by which he is employed is held liable only for true disability suffered as a result of employment. With respect to the prevention of back injuries, the physician is in a position to contribute, although for a truly effective program with this goal there must be an effort on the part of supervisors and safety personnel to accomplish the educational efforts and rearrangement of work procedures indicated to minimize the likelihood of back injuries. The physician's principal opportunity in preventing such injuries is the chance that he has to advise against the placement or continuation in any work involving back strain of an applicant for employment, or an employee, whose medical history, physical examination, or (if obtained) roentgenograms indicate a decreased fitness for work requiring a healthy back. A complete history and physical examination will often reveal a lack of fitness with respect to the back. X-raying the lower portion of the back of those who are to do heavy work often reveals contraindications to such work when the medical history and physical examination were nonrevealing in this way.

The major criticisms of preplacement x-ray examinations of the back have usually been concerned with radiation exposure or with the interpretation of, and action taken on the basis of, positive findings. With respect to the first of these problems, it is true that an applicant for employment in a position involving heavy labor who is so x-rayed and not employed because of a positive finding might possibly seek other work and have back x-rays performed by a number of other potential employers within a relatively short period of time. Some steps that might minimize this likelihood suggest themselves, and the risk involved in it must be weighed against the risk of significant back disabilities which might result from failure to detect contraindications to heavy work.

With respect to the second, some physicians have counseled against the employment of persons who have positive findings on roentgenograms of the back, the significance of which is limited and which would probably not truly influence the applicant's fitness for heavy labor (such as a small spina bifide occulta). Where this has occurred, early in the use of such roentgenograms in the railroad industry for example, it has probably resulted from the conviction of those involved that any positive roentgenographic finding in a case which is the subject of subsequent litigation unjustly influences awards made and even seems to result in the making of awards when no other evidence of an injury or of disability can be demonstrated.

With respect to the prevention of fraudulent claims and avoiding the placement in heavy work of persons who are not aware of or who conceal significant back disease or previous injuries, it seems self-evident that roentgenograms of the lumbosacral spine can be useful. As a matter of perspective, however, one must keep in mind the debatability of endorsing the employment for heavy work of a man with a back which is perfect roentgenologically but whose past behavior has revealed evidences of irresponsibility or perhaps even lack of integrity, while counseling against employment of an honest, responsible, properly motivated man who might even have a history of athletic activities, military service, and previous heavy labor without ill effects but who happens to have a roentgenologic finding of doubtful significance. In recent years, a number of helpful reports on this subject have appeared. One which illustrates impressively favorable results enjoyed largely on the basis of preplacement x-ray examinations of the lower part of the back is that by Becker (*Indust. Med.* 24:486, 1955).

CAPILLARY INTEGRITY

To the Editor:—*How can a capillary hemorrhage be differentiated from the simple passage of the blood cells through the walls of the capillaries?*

Aaron N. Gorelik, M.D., New York.

Answer.—Normally the integrity of the capillary wall does not allow the passage of red blood cells. Several factors, such as inflammation and platelet deficiency, damage the integrity of the capillary wall and allow free passage of erythrocytes into the surrounding tissue. The degree of damage to the capillary wall is one of the factors determining

The answers here published have been prepared by competent authorities. They do not, however, represent the opinions of any medical or other organization unless specifically so stated in the reply. Anonymous communications cannot be answered. Every letter must contain the writer's name and address, but these will be omitted on request.

the size of the hemorrhage. Presence of petechiae characterizes the abnormality of the capillary wall. Such small hemorrhages can readily be seen if they are present on the skin, mucosa, or eye grounds. Microscopic examination of tissue is necessary to determine the degree of hemorrhage, if present, in tissues or organs.

INFECTIOUS HEPATITIS

To the Editor:—*The wife of a patient who had infectious hepatitis received an injection of gamma globulin. Although she was free of symptoms and had no jaundice, results of the laboratory tests done the next day were reported as follows: serum glutamic oxalacetic transaminase level, 485 units, and serum bilirubin level, 0.7 mg.%. Six days later the transaminase level was 400 units, serum bilirubin level 0.3 mg.%, and cephalin flocculation 2+ after 24 hours and 2+ after 48 hours. Thirteen days after the first test the serum glutamic oxalacetic transaminase level was 185 units and the thymol turbidity 3.4 units. The patient was confined to bed for 14 days. She has remained well since then (24 days). If it is agreed that this patient had an enzymatic rather than a subclinical form of infectious hepatitis, should she be treated with bed rest, diet, and similar measures until the enzyme levels have returned to normal values? Should she be considered to be a carrier and therefore be isolated? In turn, should those who had close working association with her receive similar attention? Would the routine use of enzyme studies in household contacts be of value in curbing the spread of infectious hepatitis?*

Fritz F. Blumenthal, M.D., Middletown, N. Y.

Answer.—It would seem likely that this patient did have acute hepatitis and that she should be treated in the usual fashion until results of the serum transaminase and sulfobromophthalein retention tests are normal. It is likely that she was a carrier during the acute phase of disease and possibly longer, and so the usual enteric precautions are recommended. Those persons in close working association with her at the time might profit by receiving normal human gamma globulin. This consultant believes that the routine determination of serum transaminase level in household contacts would be of value in detecting subclinical cases of hepatitis.

Answer.—The term "enzymatic" form of infectious hepatitis is open to serious question. The use of this term would imply that the entity was a derangement of enzymes rather than damage by a virus to liver cells. In view of the danger of patients with asymptomatic infectious hepatitis developing a fulminant and fatal form of the disease or postnecrotic cirrhosis, it would be well for neither the physician nor the patient to be lulled into false security. The absence of jaundice and symptoms would not preclude this patient from consideration as having a case of infectious hepatitis. If symptoms were present, the case would be one of anicteric or nonicteric infectious hepatitis. Both the asymptomatic and nonicteric forms of infectious hepatitis would be considered subclinical and would depend on results of laboratory tests for the diagnosis.

From the findings on serial determinations of the transaminase level it could be assumed that this patient had recent hepatocellular damage. The serum bilirubin level and thymol turbidity were normal and the cephalin flocculation of 2+ is of questionable significance. The diagnosis of asymptomatic or subclinical hepatitis in this case depends on the knowledge of intimate contact with a person with an obvious case of infectious hepatitis and the persistently elevated serum transaminase levels. Because of the relatively high initial serum transaminase level (485 units), bed rest for two to three weeks and a nutritious diet would be good treatment. At the end of this period, if there were no symptoms and the transaminase level had stabilized (not necessarily returned to normal), the patient could be made ambulant. Subsequent serial determinations of the transaminase level should not reveal an elevation of more than 50 units. An elevation of 50 units would indicate the need for further bed rest.

The patient should definitely be considered a carrier and special precautions taken with respect to stools, venipuncture, and parenteral treatment of any kind. Inasmuch as proof that a person is a carrier can be established only by the injection of blood into human volunteers or by the ingestion of properly prepared material from the feces by such volunteers, all persons working in close association with the patient should be considered as potential carriers and as possibly having subclinical cases. If feasible, liver function tests, including enzyme studies, should be done to determine the clinical status of these persons. It would also be well to give each of these contacts an injection of gamma globulin, which may abort the disease even during the incubation period. The routine use of enzyme studies would be of definite value in helping to identify whether household contacts suffer from the asymptomatic or nonicteric form of infectious hepatitis. Such identification with subsequent administration of gamma globulin would protect these persons. In addition, investigation of the water, food, and milk supply, as well as sanitary measures in the disposal of feces, would be of value in curbing the spread of infectious hepatitis.

WESSON OIL

To the Editor:—*Is Wesson oil hydrogenated?*

M.D., New Jersey.

Answer.—Wesson oil is a liquid vegetable oil made from cotton seed. It is not hydrogenated. It contains 50% linoleic acid and 25% oleic acid.

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